COAST GUARD AUXILIARY AVIATION TRAINING TEXT

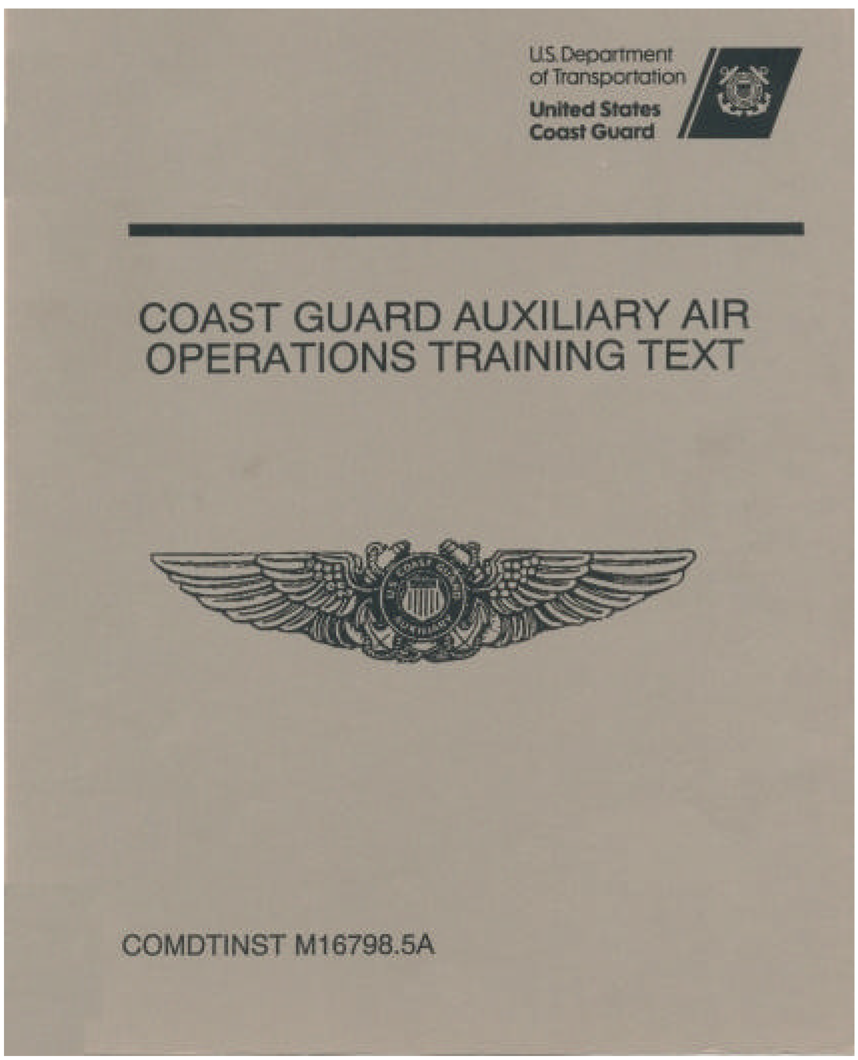
VOID

COMDTINST M16798.5A

17 September 1993

The below note is included at the beginning of Chapter 5 of this manual. The DRAFT Crew Resource Management (CRM) chapter, written for the revision of this manual but not yet promulgated, has been inserted within this document for training use.

> "27 Feb 2002 - CCGD7(oax):
> Recommend this Chapter on CRM not be used for standard training sessions within the Seventh District. While correct when this manual was released, and while it remains a very valuable educational tool for earlier CRM (then known as COCKPIT Resource Management), CRM has evolved and also has a new name. Recommend using the more-recent "Crew Resource Management" chapter prepared for the future revision of this manual, INCLUDED in this document immediately following this Chapter."



U.S. Department
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**United States
Coast Guard**

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COMDTINST M16798.5A

VOID

SEP 17 1993

COMMANDANT INSTRUCTION M16798.5A

Subj: U. S. COAST GUARD AUXILIARY AIR OPERATIONS TRAINING TEXT

1. PURPOSE. The purpose of this instruction is to promulgate the U. S. Coast Guard Auxiliary Air Operations Training Text, COMDTINST M16798.5A.

2. ACTION. Area and district commanders, commanders maintenance and logistics commands and commanding officers of headquarters units shall ensure compliance with the provisions of this instruction.

3. DIRECTIVES AFFECTED. The U. S. Coast Guard Auxiliary Air Operations Training Text, COMDTINST M16798.5-1 is cancelled.

4. DISCUSSION. The training material and information given in this text are guides designed to provide assistance in the training and education of U. S. Coast Guard Auxiliary members involved in the aviation program as pilots or crew members, and to provide a common course of study on various air operations procedures. The objective is to provide the aviation oriented member with effective, safe, and efficient procedures to be used in the execution of their assigned missions in support of the U. S. Coast Guard.

5. PROCUREMENT.

   a. The Commandant will provide all current Auxiliary aircraft facility owners with a copy of the Air Operations Training Text.

DISTRIBUTION – SDL No. 135

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
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NON-STANDARD DISTRIBUTION: See page 2.

5. b. Additional Air Operations Training Texts may be obtained through the Auxiliary National Supply Center (ANSC).

6. CHANGES. Recommendations or comments for improvements to this publication should be addressed to Commandant (G-NAB-2). Changes to this manual will be issued by consecutively numbered amendments.

VOID

L. J. BLACK
ACTING CHIEF, OFFICE OF NAVIGATION
SAFETY AND WATERWAY SERVICES

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USCG AUXILIARY AIR OPERATIONS TRAINING TEXT

TABLE OF CONTENTS

Chapter 8 OBSERVER DUTIES

Chapter 9 EMERGENCY LANDINGS AND SURVIVAL

Chapter 10 FLIGHT SAFETY

Chapter 11 MILITARY ETIQUETTE

Chapter 12 FILING FAA FLIGHT PLANS

Chapter 13 CONDUCTING THE SAR PROCEDURES CHECK

CHAPTER 1 INTRODUCTION TO SEARCH AND RESCUE

A. The National Search And Rescue (SAR) Plan

1. The National SAR Plan is a document that provides a system for the overall control and coordination of available facilities in all types of SAR operations. A single federal agency, through an appropriate rescue coordination center (RCC), coordinates all operations in its area. SAR areas and assigned responsibilities are:

   a. The Inland Area under the U. S. Air Force

   b. The Maritime Area under the U. S. Coast Guard

   c. The Overseas Areas under the various Unified Military Commanders

2. The federal agency for the area listed is responsible for organizing the existing agencies and their facilities, through a series of agreements, into a basic network for rendering assistance both to military and nonmilitary persons and property in distress. The agency also has the responsibility for carrying out the obligations of the United States within the respective SAR areas.

B. Statutory Authority To Conduct SAR

1. The Coast Guard has been given the specific statutory authority for developing, maintaining, and operating rescue facilities and for rendering aid to distressed persons and property (i.e. personnel, ships and aircraft, both military and civil) on, over, and under the high seas and waters subject to the jurisdiction of the United States. The Coast Guard may render aid to persons and property at any time and location in which Coast Guard facilities and personnel are available and can be effectively utilized. In carrying out its search and rescue function, the Coast Guard may utilize the facilities and personnel of the Coast Guard Auxiliary in performing SAR missions.

C. Maritime Area

1. The Commandant, U. S. Coast Guard, has divided the Maritime area into two sections - the Atlantic Maritime area and the Pacific Maritime area. Commander, Atlantic Area, U. S. Coast Guard, has been designated Atlantic Maritime Area SAR coordinator and Commander, Pacific Area, U. S. Coast Guard, has been designated Pacific Maritime Area SAR coordinator.

2. Each maritime area is made up of multiple Search and Rescue Regions (SAR's). Each region of the maritime area is served by a rescue coordination center (RCC), normally located at the headquarters of the designated SAR coordinator.

D. Responsibility Of SAR Coordinators

1. Primary responsibilities for SAR coordinators are defined as follows:

   a. Prompt dissemination to interested commands of all information about distress incidents requiring SAR assistance.

   b. Prompt dispatch of appropriate and adequate rescue facilities.

   c. Thorough prosecution of SAR operations until rescue has been effected, assistance is no longer necessary, or operations suspended when it is apparent that further effort would prove to no avail.

E. Duties Of SAR Coordinators

1. The following duties of SAR coordinators are of interest to Auxiliary aircrews who expect to be involved in SAR operations. They include:

   a. Establish a rescue coordination center.

   b. Ensure that a SAR plan is prepared and distributed to appropriate activities.

   c. Establish, organize, and maintain communications facilities.

   d. Designate SAR mission coordinators (SMC) for specific SAR missions.

F. SAR Mission Coordinator (SMC)

1. A SAR mission coordinator (SMC) is an official designated by the SAR coordinator to coordinate and control a specific SAR mission. Each SAR mission has an SMC who may be either the SAR coordinator or a designated official who is directed to coordinate and control a particular SAR mission.

2. Since the duties of the SAR mission coordinator require sophisticated and extensive communication capabilities, Auxiliary aircraft are usually not designated SAR mission coordinator.

G. On-Scene-Commander (OSC)

1. An OSC controls SAR operations and communications at the scene of the SAR incident when control of the mission cannot be exercised effectively by the SMC and is usually designated whenever on-scene coordination can be improved.

2. An OSC is not required for all missions, although the general rule is to designate an OSC anytime there are two or more SAR units in the area.

H. Designation Of The On-Scene-Commander

1. The SAR mission coordinator (SMC) may designate an on-scene-commander (OSC) when coordinator at the scene is indicated and such coordination can be more properly effected at the scene. If an OSC has not been designated, the first Search and Rescue Unit (SRU) arriving on scene assumes OSC responsibilities advising the SMC.

2. In designating an OSC, it is important that adequate SAR facilities be continuously available so that the OSC may effect direct control of on-scene operations and communications with assigned facilities. Frequent change of the OSC is not desirable. Seniority does not become a basis for assuming OSC duties unless it becomes essential or is ordered by the SAR mission coordinator. If the OSC happens to be airborne, on-scene control will be retained until relief by the SMC or until relief becomes necessary and is accomplished by mutual agreement with another on-scene unit. Such would be the case in the event of insufficient fuel of the airborne unit, and the SMC would be advised of such a relief by means of a SITREP.

I. Responsibility Of SAR Participants

1. The assignment of degrees of SAR responsibility among various commands in no way affects the fundamental responsibililty of any unit to initiate SAR operations as circumstances dictate. Independent action must, however, be reported immediately to the appropriate SAR coordinator through established communications channels.

2. Since Auxiliary air facilities and crews may be called upon to participate in a SAR operation at any time, all potential SAR participants should be familiar with standard procedures as set forth in this text.

J. The Auxiliary Aircraft In SAR

1. The relatively slow speed of the typical Auxiliary aircraft facility ideally suits it for searches for small vessels or debris. The fuel usage permits such aircraft facilities to search a given area with less fuel consumption than Coast Guard aircraft or some surface vessels. The use of Auxiliary aircraft facilities for selected search missions also conserves Coast Guard units for more hazardous or speciialized missions which are not suitable for Auxiliary aircraft such as medical evacuation from ships or air delivery of dewatering pumps.

2. Studies by the Coast Guard show that 86 percent of the cases to which the Coast Guard responded occurred within 3 miles of shore and that 95 percent of the cases occurred within 10 miles of shore. Thus, the single engine Auxiliary aircraft facility which is limited to 25 miles from shore (unescorted) for its operations is in a position to provide support for a major portion of the Coast Guard search missions. Scheduled weekend and holiday patrols during the boating season are one means by which Auxiliary aircrews use their facilities to provide quick response to boating emergencies. In addition, many Auxiliary aircraft owners and their observers are available during the week in case of need for call out.

3. The typical Auxiliary aircraft facility is fixed wing and therefore is not capable of rescues at sea as are helicopters. The fixed wing Auxiliary aircraft facility is used primarily as a means of locating a distress, reporting it to the proper group, station, RCC, or proper SAR mission coordinator then guiding surface craft or rotary wing aircraft to the scene.

4. One of the most effective areas of utilization of Auxiliary aircraft is in combination with surface vessels for team operations. As in any team operation, coordination is essential. Effective communications, good planning, and acceptable practices are required. Each facility will perform those functions for which it is best suited. The aircraft will provide the extended search or observation coverage desired and the increased communication range. The surface vessel will accomplish the detailed search, positive identification, and will provide the actual direct assistance. This combination may be applied in routine safety patrol, search and rescue mission, or patrolling special events such as a marine parade or regatta.

K. The Safety Patrol

1. An air safety patrol can observe out-of-the-way places and broad expanses of water areas in order to determine if any boats are experiencing difficulties and if such boats are found, can guide an Auxiliary or regular Coast Guard surface facility or other nearby vessels to the location for direct assistance. Auxiliary vessel safety patrols can be spared the high cost and ineffective cruising by locating themselves in central areas from which they can respond quickly. This combination is particularly effective for making late afternoon or dusk patrols. The aircraft can generally cover at least eight to ten times the patrol distance possible for a surface facility in the same time period. Thus, a more positive and extensive "last sweep" can be made prior to dark.

L. The SAR Mission

1. For the search and rescue mission, the combined surface/air team also provides the Coast Guard with a greatly increased capability. As with the safety patrol, the operation will center around the surface vessel with the aircraft extending its search to the limits of the search area. The search area covered in a given time by a surface/air team can be 20 times greater than that covered by the surface vessel alone. Moreover, the surface vessel will be in an optimum position for reaching the distress case when it is located by the aircraft. As time is often a critical factor in the successful performance of a SAR mission, the time saved through such jointly coordinated operations will often have a major influence on the successful outcome of the mission.

2. On those missions where the aircraft is able to locate the exact position of the distress, the surface vessel, which may be out of sight of the location of the case, can be vectored directly to the scene without any necessary maneuvering. In many cases, with the help of knowledgeable boatmen, a vessel closer to the scene than a Coast Guard or Auxiliary facililty can be vectored for the scene.

M. Limitations In Aircraft Usage

1. Although the aircraft facilitiy is an extremely effective and versatile element of the Auxiliary, there are a number of limitations that must be understood and must be considere when assigning missions to aircraft. These limitations basically take two forms although both forms

are closely related. These limitations may be of an administrative nature invoked to increase the safe use of the facilities, or a physical limitation inherent in the aircraft itself.

2. The administrative limitations are well covered in the Auxiliary Operations Policy Manual, COMDTINST M16798.3 (series), as well as in district directives designed to meet local conditions peculiar to the area. Such local restrictions must be determined before planning to utilize Auxiliary aircraft facilities on a mission.

3. In addition to the administrative limitations placed upon the use of Auxiliary aircraft facilities and crew, the physical limitations of the types of aircraft normally available to the Auxiliary must also be considered. Most obvious of these is that little direct assistance can be rendered from the aircraft. Fixed wing aircraft facilities are limited to locating the distressed vessel or other target, establishing communications if possible, air dropping needed rescue equipment if approved, and directing the surface vessels or Coast Guard rotary wing aircraft to the scene.

4. Other limitations of a particular aircraft and its crew should also be evaluated prior to starting a mission. Missions under difficult conditions should be assigned to the more experienced aircrews. This is the responsibility of the call out authority who should be kept informed by the cognizant Auxiliary air operations officer.

5. Flight time is often a limitation. Some light aircraft do not have sufficient fuel capacity to stay on stations as long as surface vessels. Most light aircraft carry fuel for at least three hours of flight with reserve however some Auxiliary aircraft have flight time capability of over ten hours. In the case of safety patrols, a significant portion of the fuel may have been consumed before discovery or notification of a SAR case. When this situation exists, the aircraft may not be able to loiter awaiting the arrival of surface help.

6. Some general aviation aircraft are not suitable for dropping objects to the surface safely. See the Auxiliary Operations Policy Manual, COMDTINST M16798.3 (series), for certification requirements for Auxiliary aircraft to deliver SAR devices.

7. Low wing aircraft have areas blocked from view close aboard each side of the aircraft limiting the search effectiveness for small targets. Cramped quarters on some smaller aircraft may increase scanner fatigue.

CHAPTER 2 SEARCH AND RESCUE PROCEDURES

A. SAR Mission Assignment

1. SAR mission assignments to Auxiliary aircraft facilities, including the nature of the mission, and the area to be covered, will be provided by the RCC or other controlling Coast Guard agency. The Auxiliary pilot must have previous knowledge of and have demonstrated a proficiency in all the various search patterns so that the assignments can be carried out without delay as they are received. The Auxiliary pilot should be familiar with the methods and techniques used in carrying them out as well as their individual strengths and limitations in order to be able to provide recommendations to the OSC. The SAR procedure flight check required of First Pilots and Aircraft Commanders fulfills this requirement.

2. The directions of the OSC should be followed provided they do not hazard the aircraft or crew. If the aircraft commander is unwilling to comply with them, the OSC must be immediately notified of that decision.

3. In many instances Auxiliary pilots have accumulated local knowledge concerning idiosyncrasies in current patterns and geographical features which may affect the success of a search. This knowledge, plus the capabilities of the aircraft should be used to make recommendations to the operational commander.

B. Patrols

1. The normal systematic search patterns will not generally be used for patrol activities. Here, the object is usually to look for vessels which may be experiencing difficulties but have not or can not make contact with surface units by radio or visual means. Such patrols are intended to cover known popular fishing and boating areas and the common routes to them. Local knowledge is the major factor used in selecting the routes and areas covered by a routine patrol.

2. The path of the patrol may be laid out on the local marine chart and then transcribed to the sectional aeronautical chart or other chart suitable for use in a cramped cockpit. Anticipated enroute times should be calculated. Where large areas are to be subjected to systematic search, anticipated search patterns, including search limits should be determined in advance. Although changing conditions such as weather and boat traffic may cause deviation of route, as much consistency as possible should be maintained at all times. For effectiveness, the boating public should be apprised of the existence, purpose, route, and time of the patrols. Coast Guard Auxiliary aircraft patrols should

not be un-planned or sight-seeing rides. They should be carefully planned and professionally conducted patrols, performed in a businesslike fashion, designed to meet specific objectives which arise from known needs.

C. Crew Briefing

1. Since the information used in briefing the search crew may originate from more than one source, it is important that the briefer or the Pilot-In-Command (PIC) garner all the relevant information into one briefing package. Such briefing information should be a full description of the type of distress or object of the search, type of search and how it is to be carried out, altitude and lateral separation, sectors assigned to observers, communications, position reports, location of surface units in the search area, and any other information required. Not to be overlooked in the course of the briefing are emergency procedures, aircraft peculiarities such as airframe masking, emergency exists, and equipment usage.

2. Briefings are required for all personnel on board in accordance with Operations Policy Manual, especially on Search missions and patrols since the briefing has been proven to have a direct effect on the observer (scanner) performance. Ample time should be allowed before takeoff for this crew briefing. A portion of the briefing prior to any search should be devoted to the characteristics of the probable targets.

D. Surface Craft Distress

1. A ship in distress may involve a large vessel still afloat but in need of assistance. In such a case, the detection probability is far greater to that of a small pleasure craft adrift in heavy weather. Large vessels are good visual and radar targets and often are able to provide an accurate fix by radio. A drifting, disabled vessel is more difficult to detect than one underway. Small surface vessels may prove difficult to detect by either visual or electronic means. Small craft and fishing vessels are even harder to detect under adverse circumstances and search aircraft, in many instances, have flown directly overhead without making visual contact.

2. If a distressed vessel has foundered prior to the arrival of rescue units, the most probable objects of search will be lifeboats, rafts, debris, oil, and personnel in the water. Lifeboats may vary in size from 12 to 50 feet in length and be of any color. Rafts may also be of any color and are found in a wide variety of sizes and shapes ranging from 4 feet in diameter and box shaped to 20 feet in diameter and circular.

3. Initially, the scene of the disaster may be marked by debris and perhaps an oil slick. The debris will be found downwind of the oil slick and boats and rafts are downwind of the debris. Persons in the water are usually found in the area of the debris clinging to floating objects. If the vessel was abandoned some time before sinking, lifeboats, rafts, and personnel may sometimes be found upwind of the point of foundering. Because of this, search units should search both upwind and downwind of the oil and debris area.

4. Small craft, such as yachts and fishing vessels, usually carry only small dinghies. Some have only balsa or pneumatic rafts while others have only life jackets. Dinghies may be of any color but are usually white or mahogany.

5. Lifeboats from large vessels are normally equipped with ample pyrotechnic visual distress signals (VDS) and if more than one boat is launched, they can expect to be grouped or tied together, making sighting easier. Boats and rafts from small craft usually have a limited supply of visual distress signals, frequently no more than the minimum required by law.

E. <u>Aircraft Distress</u>

1. If the search for a downed aircraft is to be conducted over land and heavily wooded terrain, observers should be briefed to look for broken or scarred trees, bits of shiny metal beneath the trees, burned out areas which look fresh, and parachutes or visual ground signals which may have been set out by survivors.

2. In a search over water for survivors of an aircraft incident, observers should be briefed to look for scattered wreckage such as oxygen bottles, floor boards, pieces of debris, partial or whole rafts or seat cushions. In some cases, there may be nothing other than an oil slick.

F. <u>Alert And Locate Aids</u>

1. Because it is difficult to sight a lifeboat or a life raft from the air, first contact will often be made through a visual detection aid such as pyrotechnics, dye marker, signal mirror, or an electronic detection aid such as a portable radio. Alert and locate aids for both day and night use may be divided into two general categories: Visual and non-visual. The required visual distress signals (VDS) for small craft fall into the category of visual aids. All search personnel should therefore be familiar with the appearance and characteristics of the various visual and non-visual detection aids carried on boats, lifeboats, and rafts and as personal survival gear.

a. Survivors may use balloons and box kites for raising antennas of emergency radio sets. These can indicate the presence of a life raft but can be a hazard to search aircraft. Be alert for such hazards.

b. Dye markers release a yellow-green or aluminum powder slick which remains for approximately two hours on a calm sea but only 15 minutes on rough seas. The surface to surface range of visibility is extremely limited. However, from an altitude of 3,000 feet, the slick can be seen in daylight at a distance of approximately 2 miles.

c. Signaling mirrors are one of the best daylight aids. When properly operated under ideal conditions, they are visible at distances of 10 miles or more.

d. Paulins, canvas protective covers used on life rafts, are painted red, blue, or yellow and may be used for signaling. They can also be used for limited messages using the surface to air signals.

e. Pyrotechnic signals are used as both day and night visual aids. Hand held or floating smoke signals are used in daytime. They emit a large volume of bright orange smoke that remains visible for several minutes. Under high wind conditions the smoke will dissipate rapidly making the signal less effective. Hand held flares, although better at night, are also used as daytime signals. The approved flares are much brighter than the old fuse type and are therefore quite visible from an aircraft. A common pyrotechnic signal launching device is the flare pistol. They come in various sizes including the so called pen-gun which is the size of a fountain pen and fits in the pocket. The flare is usually red in color. The meteor signal fireball can reach altitudes of from 200 to 1,800 feet depending on the size and type.

2. Non-Visual Aids

a. Emergency radio sets consist of transmitters or transceivers. The Emergency Locator Transmitter (ELT) with which Auxiliary aviators are familiar is being marketed for marine use as an EPIRB (Emergency Position Indicating Radio Beacon). Class A and B EPIRB's transmit a continuous warbling signal on 121.5 MHz and 243 MHz, which are the same frequencies used by the ELT in an aircraft. Some also have a capability for communication as well as alert/locate. Category 1 EPIRBs transmit on 406 MHz and 121.5 MHz. Each Category 1 EPIRB has a serial number which is registered when the unit is purchased and identifies the vessel on which it is located. When the Category 1

EPIRB is activated, the serial number is transmitted as a data burst on 406 MHz to a satellite which relays the information and location of the transmitter to ground stations. A continuous signal on 121.5 MHz is transmitted for tracking by direction finding equipment. Marine environment EPIRB's are designed to float and to transmit their signal while in the water. Class C EPIRBs use VHF-FM Channel 15 and Channel 16. These are required on certain commercial passenger vessels operating on the Great Lakes. The disadvantage of a class C EPIRB is that the transmission is not continuous and is not relayed via satellite. As the distribution of EPIRBs increases it becomes more important that air crews be proficient in the ELT locating techniques discussed later in this text.

b. There may be times when a close check must be made of a vessel to determine if there is trouble. A small boat in deep water and showing no wake may be unable to anchor or use power. If a close fly-by is performed, two additional signals may indicate distress. An orange flag with a black ball and square is an accepted distress signal as is the raising and lowering of both arms at the side. Neither of these signals is very effective when viewed from aircraft since they are not visible from more than several hundred yards, although binoculars may extend this somewhat.

G. Search Visibility

1. Maximum detection range is the distance at which an object may be seen and recognized from the height at which the aircraft is flying. This is a critical factor in determining the characteristics of the search patterns as it limits the sweep width of the pattern. The maximum detection range is always less than the meteorological visibility and the sweep width (W) is usually selected to be considerably less than twice the search visibility in order to increase the probability of detecting the search target.

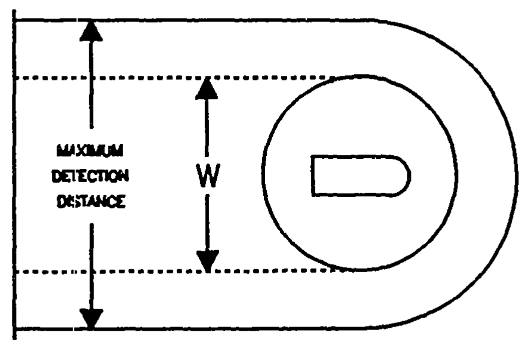


Fig. 2.1

2. It is evident that the sweep width can vary for the same situation depending on the probability of detection that is desired. For Auxiliary application, a detailed calculation such as that shown in the NATIONAL SAR MANUAL may be provided by the Coast Guard unit in charge of the search

mission. For simplicity, sweep widths based upon a single sweep probability of detection can be used. The following table of sweep widths for typical search targets is provided based on an altitude of 500 feet and for a clear day (one with 15 miles meteorological visibility). When the meteorological visibility is of 3 to 5 miles, the figures in the table should be reduced by two thirds for large objects and one half for small objects. In addition, the sweep widths must be reduced by 30 to 50 percent for small objects when the winds are in the 20 to 25 knot range and for large objects when the wind is in the 30 to 35 range. The chance for detection of small targets decreases when the wind is above 25 knots and for detection of boats when the wind is above 35 knots. Winds above 35 knots create considerable turbulence at search altitudes causing rapid crew fatigue and generally make operations by light aircraft difficult. The turbulence associated with high wind velocities is less when operating over open water offshore.

RECOMMENDED SWEEP WIDTH (W) FOR VISUAL SEARCH BY AUXILIARY AIRCRAFT

Object	Sweep Width (NM)
Person in water	.25
Life jacket	.25
Life raft	2*
Pyrotechnic signal	3
Reflective material	3
Dye marker	4*
Boat (less than 30')	5**
Signal mirror	10
Boat (30' to 60')	8**
Boat (60' to 90')	10**
Ships	13**

* Reduce sweep width by one half when meteorological visibility is 3 to 5 nautical miles or when surface wind is above 25 knots.

** Reduce sweep width by two thirds when meteorological visibility is 3 to 5 miles or when surface wind is above 35 knots.

Fig. 2.2

3. Higher altitudes, although safer for the aircraft in high wind conditions, generally do not increase the detection probability if even larger targets by any appreciable amount and will usually result in a lower chance of detection for smaller targets.

4. The chance of detecting a person in the water through aerial search is quite low, even when the person is wearing a life jacket. When such a search is undertaken an altitude of 200-500 feet is recommended. Altitudes below 200 feet will generally not improve detection probability. A low pass can be made for verification in the event that a target is detected. If the search area is sufficiently small, multiple searches of the area on different headings is suggested. If a sinking is involved, the search should be directed to locate floating debris which may be easier to detect than a person. Low passes can then be employed in an attempt to locate survivors, or a surface vessel can be directed into the area of the debris for a more detailed search.

RECOMMENDED VISUAL SEARCH ALTITUDES

Search Target	**Terrain**	**Altitude**
Person, cars, light aircraft crashes	Moderate terrain	200-500
Trucks, large aircraft	Moderate terrain	400-1000
Persons, 1 person rafts, surfboards, light aircraft crashes	Water or flat terrain	200-500
Small to medium sized boats, life rafts, trucks, aircraft	Water or flat terrain	1000-3000
Distress signals	Night-all terrain	1500-2000

Fig. 2.3

H. METHODS OF NAVIGATION

1. A key factor in the successful implementation of a search is the ability of the Auxiliary aviator to navigate and the accuracy of the navigation. Three navigation techniques are normally available to the pilot or navigator. They are:

   a. Piloting - the visual observance of surface features and their correlation with the symbols used to represent the features on a chart in order to determine aircraft location and course.

b. Dead reckoning - the application of aircraft heading and true airspeed, adjusted for reported or observed wind conditions, to determine the position and course of the aircraft in relationship to a previous visual or electronic fix.

c. Electronically assisted navigation - the use of LORAN, GPS, COR, ADF and/or DME or surface RADAR to determine aircraft location and course.

2. Obviously, combinations of these methods can be used. When LORAN or GPS is not available, two or more of the other methods should be employed, if at all possible, to improve the accuracy of the location or of the course data.

I. <u>Aircraft Turns And Straight Path Calculations</u>

1. In flying search patterns, precise maneuvering of the aircraft is essential. Unless nearby surface references are available or accurate electronic-assisted navigation can be used, precise search patterns required for effective search can only be maintained through accurately timed turns and straight-path legs. To simplify the accomplishment of accurate turns, it is recommended that all turns during pattern flights (except with precise visual or electronic fixes) be standard rate turns, i.e. 3 degrees per second, as shown by the turn and bank indicator or turn coordinator.

2. Since the radius of turn creates rounded corners instead of the usual square corners shown on search pattern diagrams, there is an obvious encroachment into the leg after each turn. For this reason it is necessary to start each turn early to make the track good. The general formula for a no-wind turning diameter of an aircraft in a standard rate of turn; i.e., three degrees per second, is:

   Turn Diameter = True Air Speed + 10/ 100

3. A large number of search patterns require 90 degree turns. In such cases, the radius of turn (with no wind) will be the same as the penetration into the next leg. Thus for a 100 KT search airspeed, the turn radius for a 90 degree turn will be .55 nautical miles and this will also be the distance of encroachment into the next leg that will have to be subtracted in computing the straight-path distance of that leg. If a 90 degree turn is required at both ends of the leg, the turn must be started an equal distance before reaching the next leg which is perpendicular to the path. For turns greater or less than 90 degrees, use the 3 degree per second rate to determine the time of the turn and use the same radius for computing encroachment. It is much simpler to adjust your search speed to one which will give an easy to calculate base than to try to compute some

airspeed. For example, at 90 knots, the aircraft covers 1 and 1/2 nautical miles per minute on the straight leg and covers 1/2 nautical mile encroachment in a 90 degree turn.

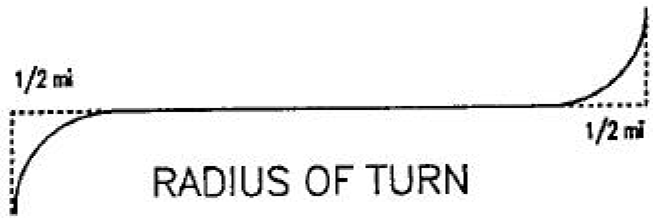


Fig. 2.4

SEARCH PATTERN GENERAL GROUPING

First Letter (Search pattern type):

T - TRACKLINE
P - PARALLEL
C - CREEPING LINE
S - SQUARE
V - SECTOR
B - BARRIER

Second Letter (Number of SRU's in the same search area):

S - SINGLE UNITS
M - MULTI-UNIT

Third letter (Amplifying/supplementary information):

R - RADAR or RETURN SEARCH
C - COORDINATED OR CIRCLE SEARCH
L - LORAN
A - ARC
S - SPIRAL
N - NON-RETURN SEARCH
D - DRIFT COMPENSATED

===

SEARCH PATTERN TERMINOLOGY:

a. Commerce Search Point (CSP)
b. Search Leg
c. Cross Leg
d. Track Spacing (S)
e. Search Area Major Axis
f. Search Area Minor Axis

g. Creep Direction

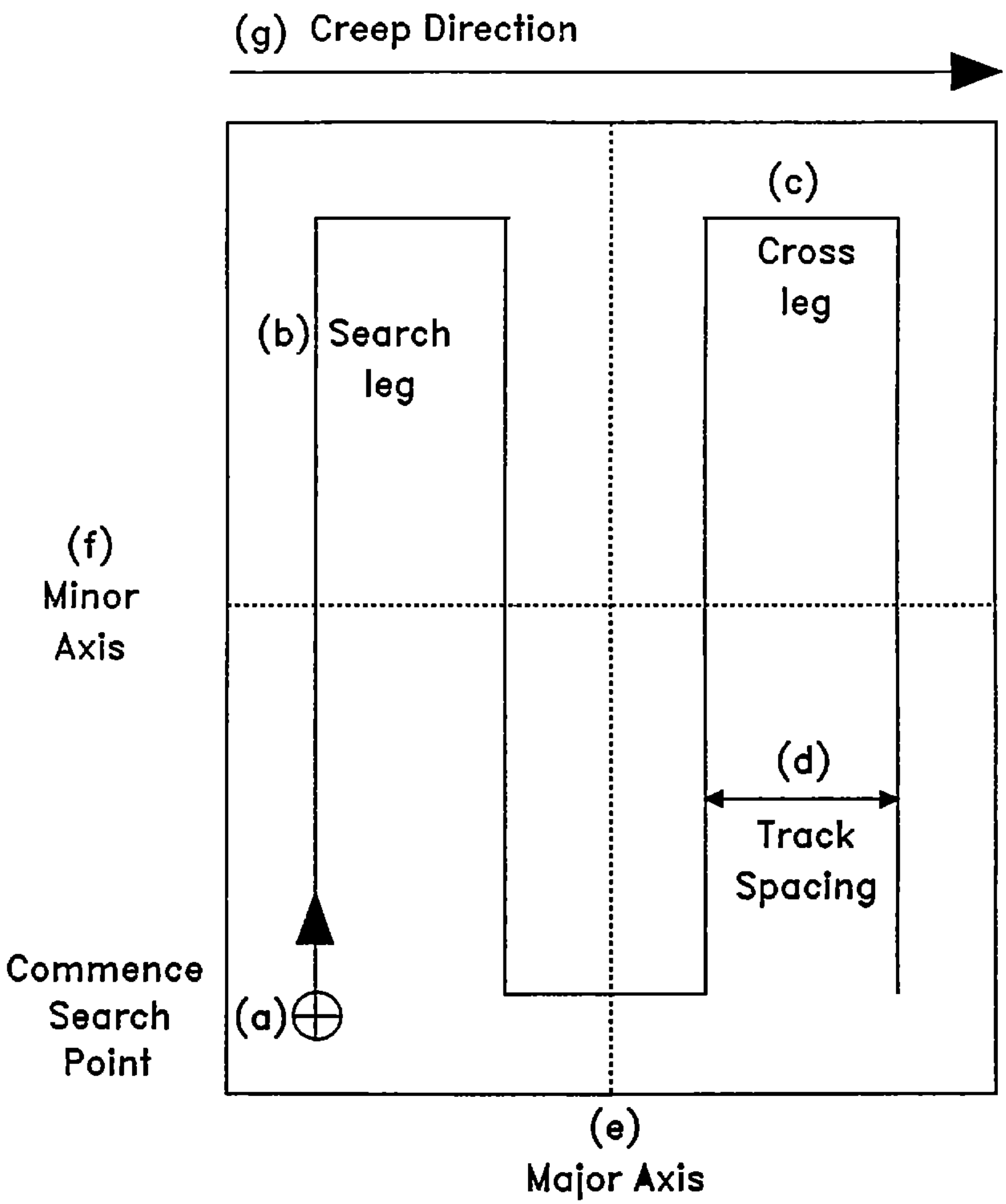


Fig. 2.5

J. <u>Types Of Search Patterns</u>

1. Search patterns for use in search and rescue operations are divided into the following main groups:

Group 1 - Trackline Patterns (T)

Group 2 - Parallel Track Patterns (P)

Group 3 - Creeping Line Patterns (C)

Group 4 - Square Patterns (S)

Group 5 - Sector Patterns (V)

Group 6 - Contour Patterns (O)

2. These groups are broken down into specialized patterns within each group. Search patterns of the same group are differentiated primarily by whether individual or formation search is employed, whether the "Air-Surface Team" is used, or by the position of the entry and departure points of the search in case of the trackline. Only the single aircraft type search patterns will be discussed in this text.

   a. Trackline (Route Search). This pattern is generally used where an aircraft or vessel is missing and the intended route of the missing craft is the only search lead. A route search is usually the first physical search action taken since it must be assumed that the distressed craft is on, or adjacent to its proposed route and that it will be easily discernible, or that there will be survivors capable of signaling when they hear or sight search aircraft. The track crawl consists of rapid and reasonably thorough coverage of the missing craft's proposed route and of the immediately adjacent areas.

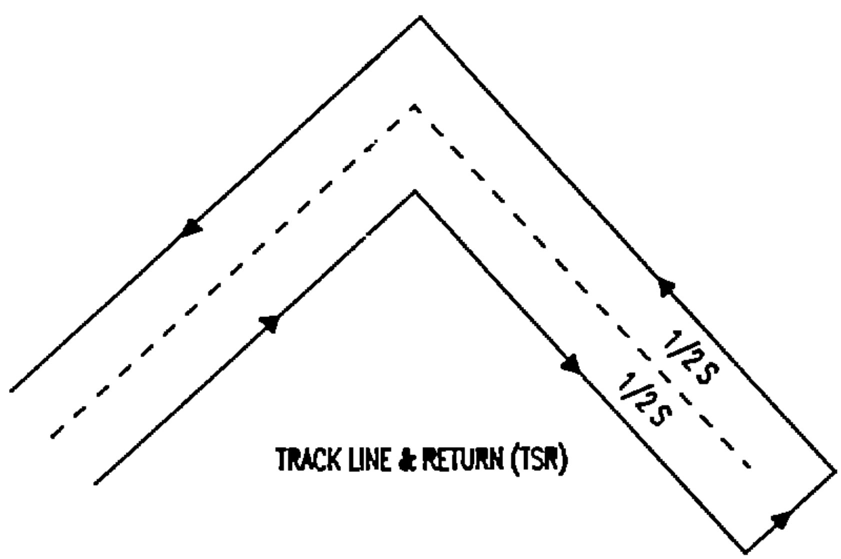


Fig. 2.6

b. Parallel Track Patterns. These patterns are most often selected when:

(1) the area to be searched is large and relatively level,

(2) a uniform coverage is desired,

(3) information concerning the target is limited to knowledge of the approximate area, and

(4) there is equal probability that the target is located anywhere in this area. This pattern is best adapted to rectangular or square areas.

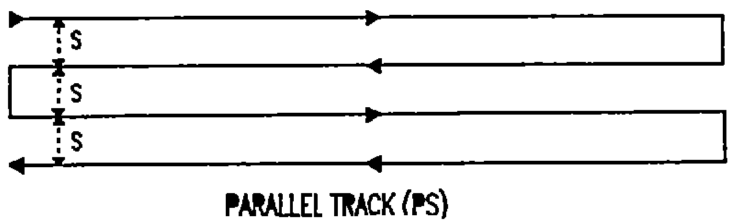


Fig. 2.7

c. Creeping Line Patterns. These patterns differ from the parallel track pattern only in that the search legs are parallel to the short axis of a rectangular area. They are generally selected when:

(1) rapid advancement of successive search legs along a given track is desired,

(2) the most probable area is covered first, and

(3) information concerning the target is limited to an area between two points where the distress position may be on either side of the original track due to navigational error or drift.

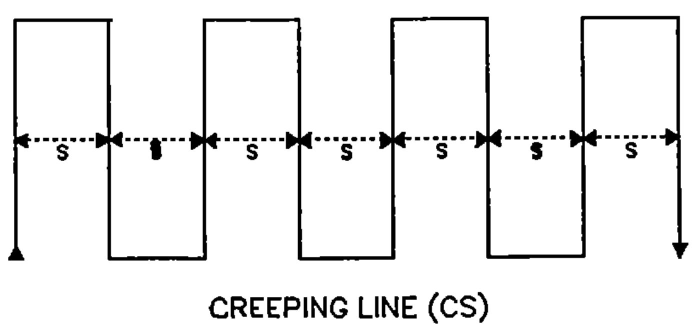


Fig. 2.8

d. Expanding Square Patterns. This pattern is used for concentrated search of a small area where the position of survivors is known within close limits and the area to be searched is not extensive. If an error in position is expected, or if the target is moving (bailout, aircraft about to ditch, or a ship that is drifting or proceeding very slowly), the expanding square pattern may be modified to an expanding rectangle with long legs running in the direction of the target's probable movement. In an expanding square pattern the first two legs are 1 track spacing long, legs 3 & 4 are 2 track spacings long, legs 5 & 6 are 3 track spacings long, etc. Note that a disadvantage of use of this pattern for aircraft is that it calls for 90 degree turns, particularly when close to datum. This may unacceptably hamper the air crew's field of vision while the aircraft is in a banked attitude thus this pattern is not frequently employed in air searches. A more applicable search pattern for an aircraft would be the sector search.

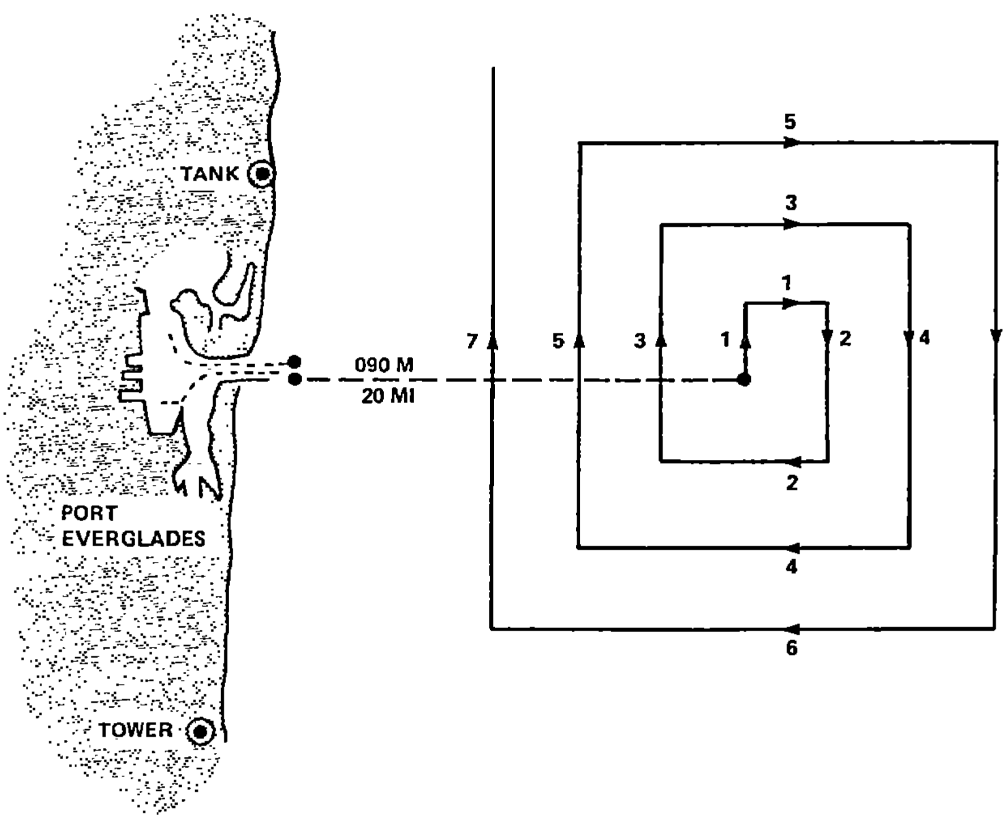
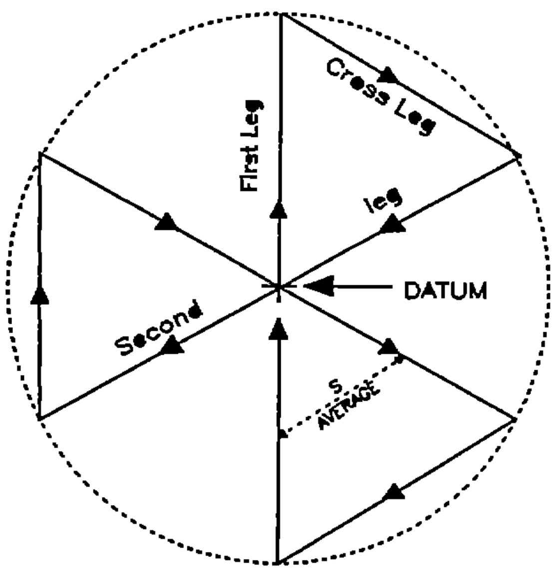


Fig. 2.9

e. Sector Search Patterns

The sector search pattern is used when the position of distress is known within close limits and the area to be searched is not extensive. It is simpler to execute, provides greater navigational accuracy, and is more flexible than the expanding square. More important, the track spacing is small near the center point of the search and larger at the extremities, resulting in an increased probability of detection near the center of the search area, the most likely position of the distress. If a drifting datum marker has been deployed, as the aircraft passes over the datum marker, the datum point for the search may be re-oriented. This adjusts the search area for the drift of the target.



SECTOR SEARCH PATTERN (VS)

Time per leg at 100 knots (Minutes)

Sector Search 60 degress between legs

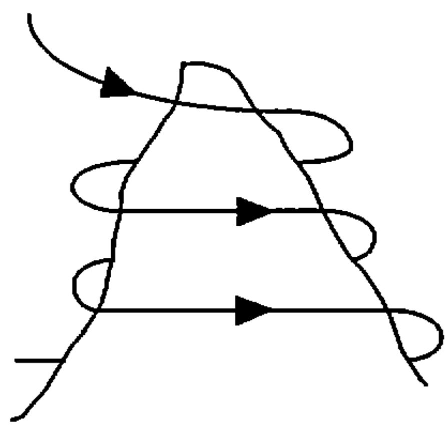
leg #	course	radius 1 nm.	radius 3 nm.	radius 5 nm.
1	360	0:36	1:48	3:00
C	120	0:36	1:48	3:00
2	240	1:12	3:36	6:00
C	360	0:36	1:48	3:00
3	120	1:12	3:36	6:00
C	240	0:36	1:48	3:00
4	360	0:36	1:48	3:00
Time to complete:		5:30	16:00	27:00

Sector Search 30 degress between legs

leg #	course	radius 1 nm.	radius 3 nm.	radius 5 nm.
1	360	0:36	1:48	3:00
C	105	0:18	0:54	1:30
2	210	1:12	3:36	6:00
C	315	0 :18	0:54	1:30
3	060	1:12	3:36	6:00
C	165	0:18	0:54	1:30
4	270	1:12	3:36	6:00
C	015	0:18	0:54	1:30
5	120	1:12	3:36	6:00
C	225	0:18	0:54	1:30
6	330	1:12	3:36	6:00
C	075	0:18	0:54	1:30
7	180	0:36	1:48	3:00
Time to complete:		9:00	24:00	45:00

Fig. 2.10

f. Contour Pattern. This is a procedure which allows a search of a mountain slope or valley with maximum thoroughness. The search is started above the highest peak and the aircraft flown around the mountain "tucked in" closely to the mountain side. As one contour circuit is completed, the altitude is normally decreased 500 feet (descending 360 degree turn opposite to the direction of search pattern) and a new contour circuit begun. The technique of mountain flying is a study in itself. If called upon to participate in such a search, Auxiliary aviators should take all the advice available from those experienced in mountain flying. Avoid flying into canyons; fly down valleys rather than up them; to be alert to rising terrain. Such a search should never be conducted without route preplanning using available topographical charts.



CONTOUR PATTERN

Fig. 2.11

K. Use of Electronic Aids In Search

1. Determining the exact position of the search aircraft relative to the selected search pattern and flying a prescribed course are the most difficult tasks in aircraft searches. These difficulties are magnified when searching over water where adequate visual references are not available. To help overcome these difficulties, use of such electronic navigational aids as are available should be made.

2. A variety of electronic equipment is available for use in aiding aircraft navigation. Most Auxiliary aircraft will have one or more of the following aids available:

   a. VOR (Very High Frequency Omnidirectional Range) receiver

b. ADF (Automatic Direction Finder) receiver

c. DME (Distance Measuring Equipment) receiver

d. LORAN C navigation computer

e. GPS (Global Positioning System) navigation computer

3. In addition, with the assistance of FAA or military surface equipment and personnel, the search aircraft may be tracked by surface radar and vectored by means of radio communications. A transponder installed aboard the search aircraft will facilitate vectoring and will permit the radar operator to work the aircraft at lower altitudes and at greater distances. Since the Auxiliary zone of search operations will usually be limited to within 25 miles of shore, there are generally many civil and military installations with radar and many FAA navigational aids within the normal range of Auxiliary aircraft equipment. Some common variations of search patterns that use available navigational installations follow.

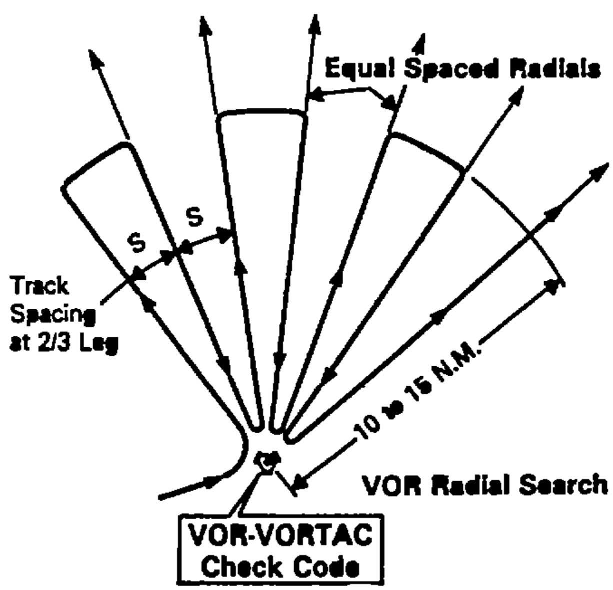


Fig. 2.13

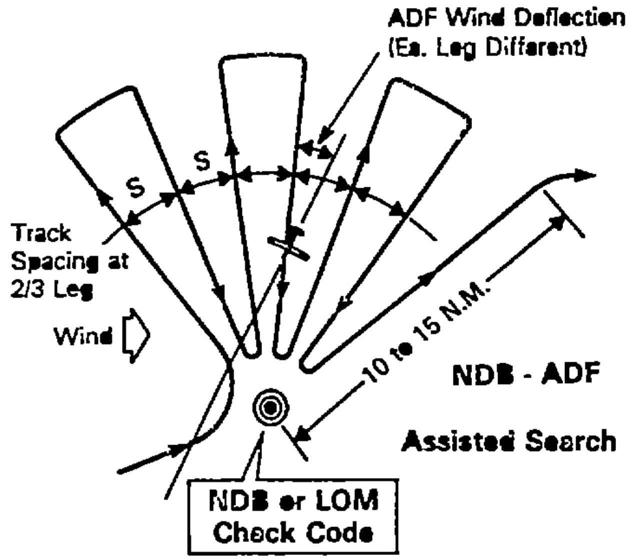


Fig. 2.14

L. Multi-Aircraft Use When Conducting Searches

1. Pre-Brief. When multi-aircraft searches are anticipated it is important to thoroughly pre-brief the mission so that all pilots understand:

   a. Exactly who is the On Scene Commander (OSC), if one has been assigned, and his or her responsibilities and authority.

   b. What frequencies will be used for air to air, air to surface vessel and search area to the controlling unit or SMC. Primary and secondary frequencies should be known by all concerned if assigned for these functions.

   c. The exact boundaries of their assigned search area.

   d. The altitude to use while in the assigned area. This will normally be a different altitude from adjoining areas to provide additional separation of aircraft.

   e. The altitude to use enroute to and from the assigned search area. This will normally be above the altitudes being used by aircraft within their search areas.

2. On Scene Commander. If an OSC has been assigned, it is the responsibility of the participating aircraft to maintain communications with the OSC and report all significant sightings. The OSC shall be informed when search areas are

near completion so additional search areas can be assigned or other instructions given. It is the responsibility of the participating aircraft to comply with instructions given by the OSC unless the aircraft is unable to due to fuel, weather or safety issue or regulatory prohibition. Any inability to comply with instructions given by the OSC must be immediately and clearly communicated to the OSC.

3. Layered searches. There may be occasions where more than one aircraft may be searching the same area at different altitudes. The Auxiliary aircraft may have a fixed wing such as a HU-25 Falcon or C-130 Hercules above and a HH-65 Dolphin or HH-60 Jayhawk working below the assigned altitude. In these cases it is imperative that assigned altitude be maintain within the search area. If a target is sighted that requires investigation any descent must coordinated with the helicopter below. Advise leaving an assigned altitude and advise upon return to the assigned altitude. Likewise when ready to depart the search area the pilot must coordinate the departure with the aircraft above.

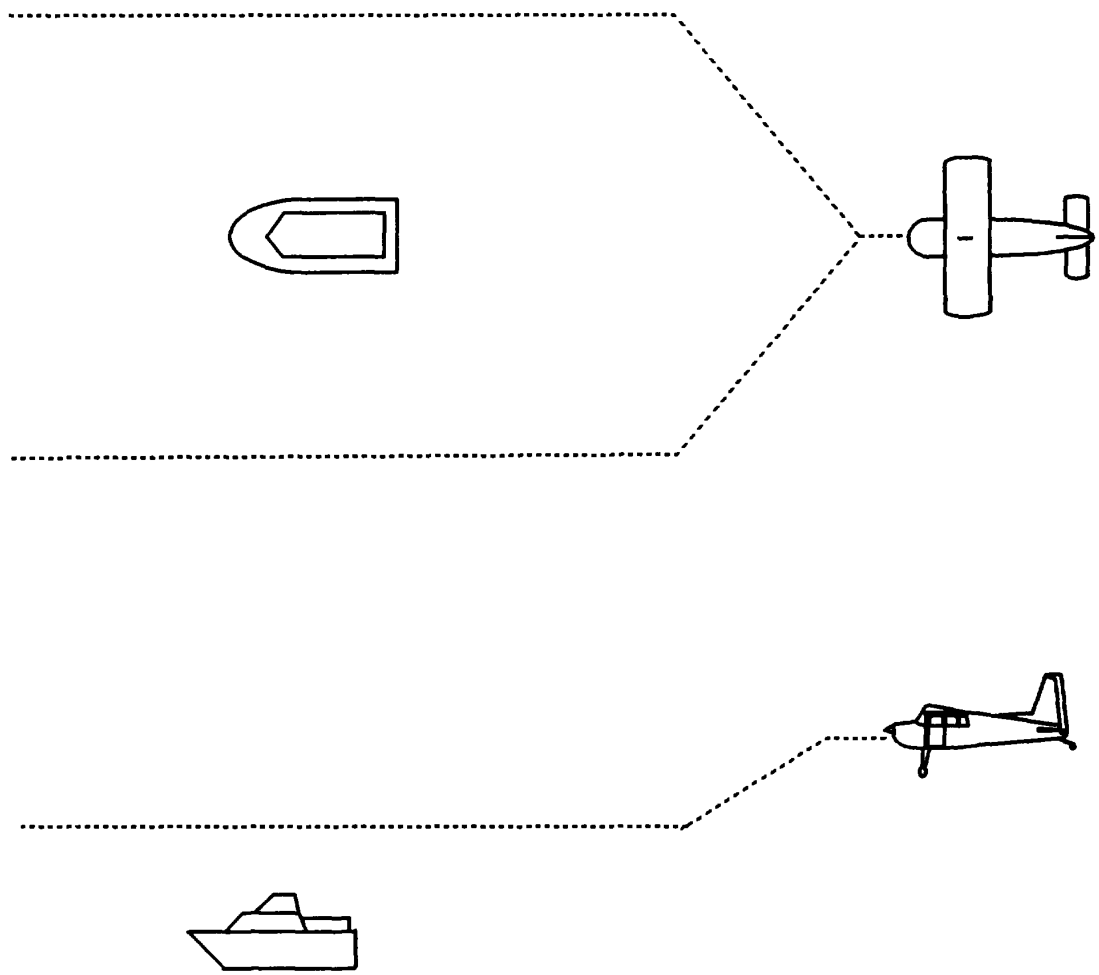
M. Identification Passes

1. Planning. When a low pass is required to identify a vessel it must be done in such a way as to not cause alarm to the persons on the surface and must be done in a safe manner that allows an escape route should mechanical difficulties be encountered during the pass. The crew should be briefed prior to the pass so each knows exactly what will happen, what to look for on the vessel and what to do in case if an emergency.

2. Route. The let down for the pass should be made some distance from the vessel and the altitude stabilized prior to passing the vessel. The pass should be made parallel to the vessel or across its stern at sufficient distance that the persons on board do not feel threatened by the pass. It is preferable to have the vessel on the starboard side of the aircraft so the observer can make the necessary observations and the pilot's only responsibility is to fly the aircraft. Do not fly any lower or closer than is absolutely necessary to note the features needed for identification. Avoid passing directly over the vessel. Repeated passes should be avoided.

3. Speed. The approach and pass should be made into the wind when feasible. This will make the ground speed as low as possible. The minimum airspeed used should be sufficiently above stall airspeed that there is time and air speed to maneuver should something unexpected happen during the pass. The flaps, if used, should be set in the maximum lift, or short field takeoff, configuration.

Indentification pass



Avoid passes directly over the vessel or across its bow

Fig. 2.14

CHAPTER 3 SUPPORT OF THE MARINE SAFETY AND MARINE ENVIRONMENTAL PROTECTION (MEP) PROGRAMS

A. <u>The Marine Safety Office</u>

1. The Marine Safety Offices (MSO) located throughout the Coast Guard districts are charged with the responsibility of facilitating safe marine commerce, protecting national security and promoting environmental safety within their assigned zones.

2. Marine Safety Detachments (MSD) are sub units of a Marine Safety Office.

B. <u>Pollution Response</u>

1. Marine Safety and Marine Environmental Protection (MEP) are two key Coast Guard programs. The principal objectives of the MEP program are to:

   a. minimize damage caused by pollutants released into navigable waters,

   b. overcome or reduce threats to the marine environment caused by potential spills of oil or other hazardous substances, and

   c. assist in national and international pollution response planning.

   Auxiliary Air Operations facilities and personnel can be of material assistance to the MSO's when responding to the first two objectives above and should be included as potential assets in response planning.

2. Fortunately, very large spills are infrequent. Nonetheless, numerous spills of all sizes occur daily. The damage caused by a spill, is a function of many variables, such as the location of the spill, type and quantity of the material spilled, prevailing weather and sea conditions, etc. It is important to note that prompt detection and notification are also key determinants of the environmental damage associated with a spill. All means that shorten the lag time between the occurrence of a spill and notification of appropriate agencies are potentially valuable in reducing subsequent environmental damages. Auxiliary aircraft whether on designated pollution patrols, SAR callout, or other mission are a useful observation platform for spill detection. (Other missions are described below.)

   Auxiliary aircraft can help the Marine Safety Offices in this mission by responding to reported spills, monitoring cleanup operations and/or patrolling harbors or other areas for unreported spills. The Auxiliary aircraft provides the MSO or MSD with a dedicated aircraft resource. Auxiliary aircraft may be deployed with an all Auxiliary crew to report their sightings or used to transport Coast Guard personnel or personnel from other Federal or State agencies.

3. The information requirements for spill reporting are somewhat technical, and may have other implications in the event of legal action initiated pursuant to federal or state statutes. Reporting procedures may differ somewhat among the Coast Guard districts. It is best if Auxiliary Air personnel visit the particular MSO or MSD being served to meet with the responsible personnel, get copies of specific reporting forms and procedures, and identify ways in which the Auxiliary can support the MSO or MSD. Some general background is provided below. Whenever possible it is desirable to gather photographic evidence to supplement written reports. Ideally these should be oblique color photographs taken with a 35mm camera or video camera, preferable one with a date/time stamp inserted on the video. Consult with your local MSO/MSD for guidance on "chain of custody" procedures to be used for exposed film or video tape. Endeavor to obtain and record the following information:

   a. Record the apparent source of the spill. Be careful in this regard. Sometimes the oil from another location up-current will hang around a moored vessel, dock or other facility and lead you to reporting a false source. Always look for traces of oil up-current of the suspected source. Often you will see a point source on a leaking facility or vessel. Record any identification readily visible. Note whether the source is a vessel, loading facility, wellhead, offshore platform, pipeline, discharge pipe, etc.

      If the apparent source is a vessel, record as much information as possible. Note the vessel type, color, location of superstructure, deck arrangement, colors on funnels, etc. Such information could be useful in the event that the vessel has departed prior to the arrival of Coast Guard personnel.

   b. Record the time of each sighting.

   c. Record the latitude and longitude and body of water.

   d. Record the following weather conditions:

      (1) Ceiling

      (2) Wind direction and velocity

(3) Sea conditions, height and direction of movement, and

(4) Visibility

e. Describe the size of the spill

(1) Direction of movement, and

(2) Direction, width and length from the source.

f. Describe the density of the oil seen. The terms defined below are used to describe the sightings. A combination of these terms are normally used since the center of a spill will tend to be thicker than the edges. These terms may be modified with **Light**, **Medium** or **Heavy**. Ranked in order of increasing spill thickness, these include:

(1) *Light Sheen*. A light, almost transparent layer of oil which causes a glassiness on the surface of the water. No "rainbow" hues are visible. Some natural biological processes can also cause a sheen.

(2) *Silver sheen*. A slightly thicker layer of oil that imparts a silvery or shimmery look to the sheen.

(3) *Rainbow sheen*. A rainbow-like reflection in the sheen.

(4) *Brown oil*. Typically a 0.1 cm to 1.0 cm thick layer of water-in-oil emulsion. The thickness can vary widely depending on wind and current conditions.

(5) *Mousse*. A water-in-oil emulsion often formed as oil weathers (the lighter components have evaporated); colors can range from orange or tan to dark brown.

(6) *Black Oil*. An area of black colored oil sometimes appearing with a latex texture. These areas are often confused with kelp beds and other natural phenomena. To confirm that oil is present, look for at least a slight rainbow sheen around the edges.

(7) *Mousse Streaks*. Dark colored oil with obvious textured appearance oriented in lines or streaks. Brown oil and mousse can easily be confused with algae scum collecting in convergent lines, algae patches or mats of kelp or fungus.

(8) *Tar balls*. Heavy globules of weathered oil that has formed a pliable ball. Size may vary from pinhead to about 30 cm. Sheen may or may not be present. These are often found along a beach after a major spill of heavy oil.

(9) *Tar mats*. Non-floating mats of oily debris (usually sediments and/or plant matter) that are found on beaches or just offshore.

(10) *Pancakes*. An isolated patch of oil shaped in a mostly circular fashion. Pancakes can range in size from a few meters across to hundreds of meters in diameter. Sheen may or may not be present.

g. Spill characteristics appear differently under low light or strong wind conditions. Observations in an "up-sun" (looking toward the sun) direction are often difficult to interpret. New observers should be teamed with experienced observers in order to make the proper distinctions between oil types and to differentiate between an oil spill and natural phenomena.

4. Reporting. Example: "A heavy rainbow sheen with streaks of black oil extends 1 mile x 100 yards south from the facility."

Remember to save all notes, working papers, and other information related to the incident. Spill information should be radioed to the cognizant Coast Guard Group office or MSO/MSD, along with any information requested. Upon landing, the cognizant Coast Guard unit should be contacted by telephone and advised of any additional information. The Auxiliarist should arrange with the cognizant Coast Guard authority how the original documentation (notes, flight logs, photographs, video tapes, etc.) should be conveyed to the MSO/MSD, if requested. Do not discard any of the original documentation until authorized to do so as these could be important evidence in any legal proceeding. Advise the MSO/MSD or Group office as soon as a spill is detected. Do not delay notification while you obtain the information listed above. The Group or MSO/MSD will advise of any additional information or specific questions to be answered.

5. As noted above, the MEP program is among the more technical of the Coast Guard programs. Although Auxiliarists can be of assistance merely by reporting a previously unknown spill, it is preferable that the Auxiliarist have as much training as possible. As previously stated, even experienced observers sometime have difficulty discriminating among the various spill appearance categories and/or between chemical or petroleum spills and certain natural phenomena.

There are several opportunities for additional training relevant to the MEP program. For example, the Coast Guard Institute offers an excellent correspondence course (available to Auxiliarists) on MEP. In addition, many MSO's offer seminars/workshops for internal personnel that Auxiliarists may attend by prior arrangement. Some districts arrange to have MEP program personnel as instructors at Air Operations seminars/meetings. Any such training should be retained in the files of the ADSO-OPA. Records of such training could be relevant in the event of legal action.

C. Transportation

1. Auxiliary aircraft may be used as a dedicated resource to transport MSO/MSD personnel to remote locations to carry out any of the missions of the MSO/MSD.

D. Area Familiarization

1. Auxiliary aircraft are excellent platforms for area familiarization flights for MSO/MSD personnel. The local knowledge of most Auxiliary aircrews is shared with the passenger(s).

E. Other Missions

1. Auxiliary aircraft may be used for any mission deemed appropriate by the district commander that is not in violation of the regulations in the AUXILIARY OPERATIONS POLICY MANUAL (COMDTINST M16798.3 series). Examples of other missions that might be undertaken in support of this activity include:

    a. Missions to prepare a photographic inventory of major industrial facilities (e.g., chemical plants, petroleum refineries, heavy industrial facilities, etc.) located along a waterway. In some MSO/MSD's annotated maps/charts are prepared identifying and cataloging these facilities. Aerial photographs can be used to supplement this information.

    b. Missions to serve as a photographic platform for Coast Guard personnel seeking to document events associated with a spill or remediation efforts.

    c. Missions to provide focused area familiarization for such decisions as site selection for prepositioning of spill response equipment.

    d. Missions in support of other studies relevant to the MEP program. In one district, Auxiliary aircraft were used to inventory and photograph derelict barges and other vessels that are potential pollution sources or areas for illegal disposal of toxic wastes. Use of Auxiliary aircraft was much more efficient than use of surface resources for this purpose.

F. Call Out Authority

1. Operational orders for Auxiliary aircraft must be approved by a group commander, air station commander, or district office. Auxiliary aviation program managers should endeavor to coordinate the flow of operational requests from the MSO's/MSD's by prearranging order issuing approval with an appropriate call out authority.

G. Utilization

1. Auxiliary aviation program managers are encouraged to visit the MSO/MSD, get to know the commanding officer, the operations officer and unit personnel, explain what Auxiliary aviation resources are available and how to request them. The MSO/MSD should be provided with a current list of the Auxiliary aircraft available in their area of responsibility. Revisit the MSO regularly to encourage the use of Auxiliary aviation.

2. It is most important that commitments made be fulfilled. If the MSO/MSD is depending on an Auxiliary aircraft that fails to appear for a mission, they will soon lose confidence in this asset.

CHAPTER 4 SUPPORT OF THE AIDS TO NAVIGATION PROGRAM

A. Background

1. The Aids to Navigation (ATON) program helps to insure the safety, security and efficiency of the maritime transportation infrastructure by:

    a. Operating long range electronic radionavigation aids (LORAN-C and Omega) as well as domestic radio beacons;

    b. Maintaining short range aids to navigation, such as lights, fog signals, buoys, day beacons, and RADAR transponders (RACONS); and

    c. Operating vessel traffic services (VTS) in several key ports.

2. The inventory of federal aids to navigation maintained by the Coast Guard consists of over 48,000 buoys, beacons, and other ATONs distributed along the coastal and inland waters of the United States, its territories, and the Trust Territory of the Pacific. In addition, the Coast Guard regulates more than 45,000 private aids to navigation.

3. As with many other programs, the Coast Guard Auxiliary provides assistance to the Coast Guard (and other concerned federal agencies) in myriad ways, including reporting discrepant aids to navigation, verifying private aids, and submitting chart corrections/updates.

4. The sight of Coast Guard small boats and buoy tenders examining and maintaining aids to navigation is familiar to Auxiliarists and mariners alike. Given the care and diligence required in this activity (e.g., the use of horizontal sextant angles and precise electronic systems for determining whether or not a buoy is off station) it may seem odd to include this activity in a text on air operations, where the observer may be limited to brief glimpses of such aids from a rapidly moving platform at altitudes of 500 feet or more. Nonetheless, pilots and observers can make a substantial (although limited) contribution to the ATON program. The relatively high speed of the typical Auxiliary aircraft permits a rapid search of an area to identify aids that may have discrepancies of one type or another. Potential problems with these aids can be confirmed by follow-up visits by surface craft or other assets.

5. To be effective in most operational programs, Auxiliarists need specialized training and can benefit greatly from detailed local knowledge. The ATON program is no exception in this regard. Indeed, it can be argued that the ATON program is particularly demanding of specialized expertise and detailed local knowledge. Pilots and (particularly) observers seeking to employ aircraft in support of the ATON and chart updating programs should be thoroughly familiar with applicable guidance documents and district policy.

B. Missions

In addition to the usual logistics, VIP transport and area familiarization flights that can be undertaken in support of this program, there are two more specialized missions that arise: **discrepancy reporting** and **chart updating**. These are emphasized in this chapter.

C. ATON Discrepancies

1. Table 4.1 presents a brief list of common ATON discrepancies, partitioned into the conventional classifications of **critical**, **urgent**, and **routine**. For each discrepancy, a subjective (but informed and conservative) estimate of the probability of detection (POD) from a typical Auxiliary aircraft is provided.

TABLE 4.1 MARINE NAVAID DISCREPANCIES		
Class and Action Required	**Discrepancy**	**Remarks on Aircraft Detection**
Federal; Aids Only– Critical Discrepancies, Report by Radio	1. Aid totally covered or shrouded in ice.	Probability Of Detection (POD) likely to be high.
	2. Light signal showing improper characteristics or rhythm.	POD low.
	3. Light signal obscured or extinguished.	POD can be high, depending on circumstances.
	4. Sinking or submerged buoy.	POD likely to be high.
	5. Buoy off station, adrift, missing, capsized or stranded.	POD likely to be high for buoys markedly off station, missing, capsized or stranded.
	6. Radiobeacon off the air or giving improper characteristics.	POD likely to be high if aircraft equipped with proper ADF and current LIGHT LIST aboard.
	7. Vandalism of aids either in progress or the result of such action.	Variable POD, depending on type and extent of vandalism.
	8. Aids damaged by vessel collision.	Variable POD, depending on nature and extent of damage.
	9. Collapsed bridge structures and fender systems.	Variable POD—likely to be high for major damage.

TABLE 4.1 MARINE NAVAID DISCREPANCIES		
Class and Action Required	**Discrepancy**	**Remarks on Aircraft Detection**
Federal; Aids Only– Urgent Discrepancies, Report by telephone or radio to appropriate group.	1. Dayboard missing or damaged by causes other than vandalism.	POD variable, depending on circumstances.
	2. Sound signal failure; Whistle, bell, gongs or their tappers missing.	Detection virtually impossible from aircraft.
	3. Radiobeacon timing sequence incorrect.	POD likely to be high if aircraft equipped with ADF and Light List.
	4. Light burning dimly or showing reduced intensity.	POD likely to be low.
	5. Light partly or totally obscured by dayboards.	POD likely to be low.
	6. Bridge light outages; inoperative draw, swing, lift or retractable bridges.	POD likely to be low.
Routine discrepancies for Federal and all private aids. Report by mail and/or telephone.	1. Aid obscured by foliage or other objects that should be removed.	POD likely to be low.
	2. Faded dayboards.	POD likely to be low.
	3. Delamination of dayboards.	POD likely to be low.
	4. Leaning structure, more than 15 degrees.	POD likely to be low.
	5. Bird nests on aid.	POD likely to be low.
	6. Improper dayboards according to Light List.	POD likely to be low.

TABLE 4.1 MARINE NAVAID DISCREPANCIES		
Class and Action Required	**Discrepancy**	**Remarks on Aircraft Detection**
	7. Retroreflective material peeling, missing, or inadequate.	POD likely to be low.
	8. Dayboard missing.	POD variable depending on circumstances.
	9. Numbers that are obliterated and not easily read.	POD likely to be low.
	10. Extensive bird fouling on aid.	Possible in extreme circumstances.
	11. Peeling paint interfering with ability to see aid.	POD likely to be low.
	12. Extensive deterioration and/or rotting of wood supporting aid.	POD likely to be low.
	13. Missing vent valve on lighted buoy.	Detection virtually impossible from aircraft.

2. Several examples are furnished below to illustrate the use of the table and to provide amplifying remarks about certain of the judgements.

   a. Sinking or submerged buoys (item 4 under **Critical** discrepancies) are quite likely to be detected by trained and competent observers in an aircraft. This is particularly true in cases where the pilot or observer has substantial local knowledge, visibility is well above minimums for flight under Visual Flight Rules (VFR), and the location of the buoy is such that there are numerous landmarks to facilitate orientation/navigation. Detection of missing buoys in a well identified harbor or marina entrance is relatively simple. Detection of a missing buoy may be more difficult for offshore buoys if the aircraft does not have a functioning LORAN-C or Global Positioning System (GPS) receiver. This is necessary because the aircraft has to be quite certain of its position to draw the inference that an unseen buoy is missing or off station.

b. Buoys off station, adrift, capsized, or stranded are also judged to have a high POD. The fact that a buoy is only slightly off station may not be able to be determined from the air, because it is not possible to establish the actual location of the buoy. A buoy markedly off station is likely to be detected. Beached or capsized buoys are easily detected.

c. Radio beacons off the air or giving improper characteristics are likewise easily detected, provided the aircraft has an automatic direction finding (ADF) receiver and a light list to consult for details on frequency and characteristics.

d. Vandalism is more difficult detection challenge. It is relatively easy to spot vessels tied up to buoys or other ATON structures and/or persons on such structures, but the detection of damage is difficult if the damage is only slight.

e. Aids damaged by vessel collision are judged to have a variable POD, depending on the extent of damage. If it is likely to be difficult to distinguish the cause of damage (collision or vandalism) from close in surface inspection, let it alone from the air.

f. Under the right circumstances (e.g. in cases where the aircraft's position can be fixed precisely, observations are taken during darkness, or the twilight before or after darkness, and in good visibility) it is relatively easy to determine that a navigational light is not present. This may mean that the buoy or structure is missing or that the light is inoperative. In other cases (e.g. "cluttered" ligths in the vicinity of a harbor) detection and identification may be more difficult. For this reason, the "remarks" column under this task is written as "POD can be high, depending on circumstances". Ideally, a patrol should be run after twilight when the light level is low enough so that both the lights and the buoy or light structure would be visible.

3. A careful reading of table 4.1 indicates that aircraft can be expected to perform well for many of the critical discrepancies, some of the urgent discrepancies and a few of the routine discrepancies. Although the overall performance of the aircraft platform is limited, the fact that aircraft are useful for detection of so many critical discrepancies is noteworthy.

4. The ability to identify critical discrepancies and to cover large areas in a short time is particularly valuable for "after storm surveys" to assess the damage after major storm

events. In winter, overflights can be used to assess damage to buoys and other aids resulting from ice.

D. Chart Updating

1. The Coast Guard Auxiliary furnishes valuable information to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Survey (NOS), for chart correction and updating of nautical and aeronautical charts. (For general information, background, and a discussion of appropriate forms to use, see the latest edition of the AIDS TO NAVIGATION AND CHART UPDATING MANUAL.) Auxiliarists on land and in surface vessels have gathered the necessary appropriate data for this purpose for many years. Until recently, aircraft have not been widely used as an observation platform. There is an increasing realization of the utility of aircraft in the chart updating program.

2. Table 4.2 provides a capsule summary of the type of information useful for the chart updating mission together with brief remarks on the suitability of aircraft as an observation platform. As a general proposition, it is fair to state that aircraft can detect and identify many of the objects (e.g., bridges, dikes and levees, jetties and breakwaters, marinas, dry docks, utility lines, docks, landmarks, towers, etc.) that may need to be added or deleted from natuical and/or aeronautical charts. Some of the technical or measurement information needed such as lighting, dimensions, clearances, contents of pipelines, channel depths, etc., may need to be gathered by a ground follow-up survey. In other words, aircraft observation is used to detect and identify items relevant for chart correction but additional "ground truth" information is also needed. A typical chart updating mission, perhaps integrated with a conventional safety patrol, would have onboard observers annotating appropriate charts with the approximate location of items of interest for later follow-up with automobiles or surface vessels.

3. Operators of aircraft specially equipped for aerial photography can gather imagery directly suitable for photogrammetric purposes. Even oblique 35mm photography is useful for documentary purposes to accompany information contained on appropriate forms.

TABLE 4.2 CHART CORRECTIONS/UPDATES		
Object	Item to be reported	Remarks on likelyhood of aerial observation
Airports, landing strips	Identify new or discontinued.	New airfields are relatively easy to identify Abandoned fields or runways marked with an "X" are easy to detect.
Bridges	New, removed, under construction or ruins. Give location, type, lights, vertical and horizontal clearances.	Many of these items can be easily seen from an aircraft. Clearance data requires ground survey.
Cables	Over or under navigable waters. Give location, type, an clearances.	Pylons for overhead cables are relatively easy to detect. Clearance data requires ground survey.
Channels	Report new or revised channels. Indicate centerline, controlling depth and width discrepancies for existing channels other than Corps of Engineers project channels.	Changes in the flow pattern of a channel is often visible from the air Depths and other information requires ground based follow–up effort.
Coast Guard Station	New, discontinued, or change in facilities.	Best handled administratively rather than by aerial observation.
Cribs and water intakes	Visible or submerged. Give size & type of construction and depth if submerged.	General features visible. Ground follow–up necessary for technical and measurement data.

TABLE 4.2 CHART CORRECTIONS/UPDATES		
Object	**Item to be reported**	**Remarks on likelyhood of aerial observation**
Dams	Type, Position, Lights and other pertinent data.	New Construction easily visible.
Dikes and levees	Type height and extent.	New construction easily visible.
Dolphin and other pilings	Visible or submerged	Large objects are easy to detect.
Drydocks	New or discontinued.	Easily visible from the air. Observers need to be familiar with the appearance of a drydock.
Duck blinds	Temporary or permanent structures.	Generally visible from the air. Likelihood of detection may vary with the season and lighting.
Dumping grounds and spoil areas	Extent of same.	Surface features generally visible from the air.
Fish havens	Obstruction (artificial fish havens)	N/A
Fish trap area	Show limits of area covered.	N/A
Fish Stakes	Visible or submerged. (outside of charted trap area)	Detection possible in some cases.

TABLE 4.2 CHART CORRECTIONS/UPDATES		
Object	**Item to be reported**	**Remarks on likelyhood of aerial observation**
Ferries	Type, docking facilities, and underwater or overhead cables. (if any)	Easily visible from the air.
Groins	Type, visible, submerged, or ruins.	Easily visible from the air.
Jetties and breakwaters	Type, visible, submerged or ruins.	Easily visible from the air.
Landmarks	New, destroyed or obscured. Recommend new ones visible from seaward.	Task can be done from the air but a surface vessel may be a better platform.
Log booms	Extent and location. A navigational hazard?	Easily visible from the air.
Marinas & marine facilities	Report new, discontinued or changes in services offered.	New marinas are easily detected, particularly in remote areas. Extensions to existing marinas are best detected during the construction phase.
Marine construction	Bulkheads, wharves, docks, piers, dredging, etc.	Easily visible from the air.
Marine railways	Report new or discontinued; also vessel length and tonnage capabilities.	Easily visible from the air. Technical information from ground survey team.

TABLE 4.2 CHART CORRECTIONS/UPDATES		
Object	**Item to be reported**	**Remarks on likelyhood of aerial observation**
Obstructions	Type, visible, submerged, permanent, or temporary.	Surface features easily visible from the air as are some submerged features.
Piers and docks	New, discontinued, extended or ruins, visible or submerged.	Surface features easily visible from the air as are some submerged features.
Platforms (all types)	Type, marking, lights and hazards.	Surface features easily visible from the air as are some submerged features.
Piles	Visible or submerged. Single or multiple. Indicate arrangement.	Surface features easily visible from the air as are some submerged features.
Pipeline	Overhead or submerged, give clearances. Indicate material contained if known.	Pipeline contents need to be established by ground survey.
Ramps	Type surface and length. (private or public)	Surface features easily visible from the air as are some submerged features.
Radio broadcast stations	New or discontinued, call letters, frequency, tower height, and lights.	Radio antenna can be detected, but the task is more difficult than it appears. Ground survey is necessary for technical details.

TABLE 4.2 CHART CORRECTIONS/UPDATES		
Object	**Item to be reported**	**Remarks on likelyhood of aerial observation**
Rocks	Visible or submerged, single or cluster.	Visible rocks are detectable as are some submerged rocks.
Ruins	Not covered in other categories.	Variable POD.
Sewer outlets	Size and type of construction.	Generally visible. Changes in water color in vicinity of outfall may serve as tip off.
Shoals	Visible or submerged.	Often visible from the air.
Snags	Type, visible, or submerged.	Often visible from the asir. A wake in a current is sometimes a tip off.
Stacks and chimneys	Markings, lights and construction.	Generally visible from the air.
Wrecks	Visible or submerged at tide, lake or river stages.	Generally visible from the air.

4. Experience shows that chart updating from the air is a somewhat tedious process, although certainly interesting to many, requiring careful preparation and attention to detail. It is recommended that only limited areas be surveyed at any one time; the balance of the operating area can be surveyed on subsequent flights. Limiting the extent of the survey permits the observers to become intimately familiar with the charted features so that differences (candidates for updates) can be readily and efficiently identified.

E. Other Missions

In addition to the missions described above, there are many other opportunities for the use of aircraft in support of the ATON mission. The range of such application is limited only to the imagination of Auxiliary personnel. Here are a few ideas to stimulate your thinking:

1. It is often helpful to provide area familiarization overflights for ATON personnel. Flying a "pre-cruise" mission for the crew of buoy tenders provides them with a bird's eye view of the mission area, may help to identify additional discrepancies that need to be corrected, and help to determine what additional supplies need to be loaded.

2. Whenever there is a change of command for a locally based buoy tender, there is an opportunity to take the incoming and outgoing commanding officers (CO) on an area familiarization flight. The use of aircraft enables the new CO to become quickly familiar with the peculiarities of the area via the exchange of information from the outgoing CO as they fly over the command's area of responsibility.

3. These are occasions when a part for a ship or a special item to repair an aid needs to be transported quickly to a remote location. Auxiliary aircraft are effective for this purpose.

4. As commercial and recreational boating expands, additional aids to navigation may be required. Group or District personnel can use Auxiliary aircraft to aid in the planning process. Auxiliary overflights can also be used for special purpose surveys, such as vessel counts that may also be useful in evaluating the need for additional aids.

F. <u>Training</u>

1. As noted above, the ATON mission is more specialized and technical than many other Auxiliary tasks. This places a premium on trained observers; trained both as observers and in terms of the ATON mission (e.g. aid verifiers). Although annual and other recurrent training such as the annual air operations seminar, can be useful for this purpose. Additional training is likely to prove necessary.

2. It has been said that "sight is a faculty, seeing is an art." Beginning pilots are often at a loss to see ground features pointed out by instructors, some as important as their own airport, because they have not acquired the necessary experience in viewing things from the air. Over time, the beginning pilot gains this ability to detect and identify items from the air. In the same way, pilots and observers can be trained to identify objects of navigational interest from the air. The rate of learning is facilitated if pilots and observers are familiar with the appearance of objects of interest from the ground. It is obvious, for example, that aviation personnel will have trouble identifying dry docks and marine railways from the air if they don't know what they look like from the surface.

G. Safety

Aerial surveying of aids to navigation should be accomplished from close enough to observe relevant objects, but not at the risk of either damaging the aircraft or causing alarm to persons on the ground.

CHAPTER 5. COCKPIT RESOURCE MANAGEMENT

A. Cockpit Resource Management (CRM)

The purpose of this chapter is to introduce the Auxiliary pilots, observers, and potential crew members to the principles of CRM.

1. CRM came about as the result of a study conducted by NASA in 1979. The intent of the study was to structure a meaningful research program to address some of the more perplexing problems and underlying factors causing so-called "pilot error" accidents. Pilots were asked to discuss their concerns, perceptions and experiences with researchers. During these discussions a consistent theme emerged; pilots were dissatisfied with current training programs. They were not necessarily concerned with the technical "stick and rudder" training, but rather the absence of training in other skills such as decision making, command leadership, and communication.

2. From the research, a new approach to flight training was developed. This approach is known as Cockpit Resource Management (CRM) training. CRM training has gained significant support by the airline industry, by regulatory agencies, and by the Coast Guard. CRM training is specifically designed to improve communication and teamwork among members of flight crews and to foster the use of all the resources at their disposal.

3. CRM deals with resource management of flight operation. CRM is defined as the effective utilization of all available resources: the use of equipment and people to achieve safe and efficient flight operations. Resources include autopilots and other avionics systems; operating manuals; and people, including crew members, air traffic controllers, and others in the flight system.

4. The principles of CRM can be used within the Coast Guard Auxiliary aviation program. CRM principles apply even in the single pilot environment by utilizing all available resources both in the cockpit and on the surface.

B. Resource Management

Resource management is the concept of effectively using all available resources. These include hardware, software, or a term that is becoming more prevalent in the management field, humanware, to achieve a successful outcome.

1. Used within the framework of resource management are the terms Human Factor (US) and Ergonomics (Europe). These terms are, for our purposes, synonymous and are used to describe the study of human interaction or involvement in a

mishap or accident chain. Human factors have been studied in many forms over many years. Two significant studies are worthy of a brief review prior to discussing resource management training.

a. Study one The Hawthorne study, conducted at a Western Electric plant, set out to determine to what degree lighting conditions, dim/bright illumination, influenced worker productivity. The scientist postulated that bright lighting would result in high productivity and dim lighting would result in low productivity. What the scientist discovered would radically change the field of behavioral science from that day forward. The significance of this study was that both conditions produced higher productivity. The cause of this "enlightenment phenomena" was determined to be not the difference in lighting conditions, but that management was paying attention to the people that made up the work force. In other words, workers responded more positively to attention than conditions.

b. Study two This study emerged from the circumstances surrounding the crash of a DC-8 on approach to the Portland Oregon International Airport on 28 December 1978. The investigation revealed that the captain, a pilot with over 27,000 flight hours, 5,500 hours in type, lost "situational awareness" while attempting to resolve a minor problem with the landing gear. This loss of situational awareness, manifesting itself in the captain's disregard for the input from his first officer and engineer, resulted in the aircraft running out of fuel six miles from the airport. Based on their investigation, the National Transportation Safety Board (NTSB) issued the following statement:

(1). Probable cause: Failure of the captain to monitor the aircraft fuel state, to respond to the low fuel indications, and to respond to the crew members' advisories regarding the fuel state. Contributing to the accident was the failure of the other two flight crew members either to fully comprehend the critical nature of the fuel state or to successfully communicate their concerns to the captain.

(2). Safety recommendation: Issue a bulletin to all air carrier operation inspectors directing them to encourage all commercial air carriers to have their flight crews indoctrinated in the principals of flight deck resource management with particular emphasis on the merits of participatory management for captains and assertive training for other cockpit crew members.

As a result of the investigation and the recommendation of the NTSB, that airline, and three other airlines, immediately started presenting CRM training to their flight crews. In addition, a spin-off training called Line Oriented Flight Training (LOFT), also was derived. LOFT training is accomplished in simulators where flight crews are confronted with emergencies, or other situations that require and measure their ability to interact effectively to resolve problems.

C. CRM Concept

1. Performance. Effective performance depends on both technical performance and interpersonal skills.

2. CRM focus. CRM focuses on crew members attitudes and behaviors. A primary focus of CRM is effective team coordination. The team encompasses the flight crew, air traffic controllers, maintenance, and other groups that interact with the cockpit crew. A shift in terminology reflects this emphasis. Cockpit resource management can be appropriately termed Crew Resource Management.

3. Effective CRM involves the entire flight crew. CRM is not simply the responsibility of the pilot in command, nor should CRM be viewed as pilot training. All crew members are responsible for the effective management of the resources available to them.

4. Acquisition of CRM. The acquisition of effective CRM skills requires the active participation of all crew members. Effective resource management skills are not gained by passively listening to classroom lecture, but by active participation and practice.

D. NASA Rules

These rules were primarily developed for the flight deck of an air carrier, but the principles are valid for the Auxiliary aviation environment which will probably be a pilot and observer or a pilot alone in a single or light twin. The basics are as follows:

1. In abnormal situations, the first order of business must be to decide who flies the aircraft and who monitors or works on the problem.

2. Positive delegation of monitoring duties is as important as positive delegation of flying duties.

3. The pilot flying must not attempt to accomplish secondary tasks during busy portions of a flight.

4. Whenever uncertainty or conflicting opinions of fact occur, such as a misunderstood radio transmission, the conflict must be resolved unequivocally using external sources of information. (For example, request a repeat of the transmission.)

5. If any crew member doubts a clearance, procedure or situation, he or she is obligated to make that doubt known to other crew members.

E. Workload Management And Situational Awareness

These skills reflect the extent to which crew members maintain awareness, prepare for contingencies and manage workload and stress.

1. Workload management. Workload management includes preparation, vigilance, avoidance of distractions and complacency. Workloads vary according to the phase of an operation, from the routine of preflight planning and enroute cruise to the high workload of a low visibility instrument approach. Either workload can be dangerous. Accidents often occur when the workload demand exceeds crew capability. Paradoxically, a low workload can also be a hazard to safety. Crews tend to be less alert during long cruise segments. These low workload period are times when complacency, forgetfulness, and drowsiness are most common.

2. Situational awareness. Distractions can come from either inside or outside of the aircraft. The keys to dealing with distractions lie in the flight crew's ability to focus on aircraft control and hazard avoidance. The crew should be prepared to avoid distractions. The pilot in command should fly the aircraft and delegate any tasks that might interfere with flight operation.

   Elements of situational awareness:

   a. Mission Status
   b. Resource Status
   c. Personal Status
   d. Time Orientation
   e. Geographic Orientation

   Tools for situational awareness:

   a. Standard Operating Procedures; used by the USCG, USCG AUX., FAA, Local publications and/or the Pilot Operating Handbook or Flight Manual for the aircraft.

   b. Most Conservative Response Rule; If confusion on the flight deck exists, take the most conservative response.

F. Psychological Factors

CRM includes attitude, personality, and motivation in the decision making process.

1. Motivation of crew members. The pilot in command must maintain a positive climate on the flight deck and encourage crew members to fully participate in crew activities. Creating the proper climate is important. This can be done by maintaining an "open" cockpit atmosphere, having the crew members speak up when things do not seem right, or ask questions if they do not understand. It is up to the pilot in command to promote positive relations by providing non-punitive critique and feedback.

2. Assertiveness. Assertive behavior indicates highly developed skills in both task and relationship and is most likely to produce an assertive response from other crew members and insure the open exchange of information. As a pilot in command, you have the authority to either accept or reject the advice or opinion of others. Listening and responding to your flight crew does not mean abdicating command.

G. Stress Management

Stress is our psychological and physiological reaction to tension. It occurs when physical and/or mental demands are placed on us. Because stress results from out perception of environmental events, stress is truly in the "eye of the beholder". What may be very stressful for one person may produce little or no stress on another. The degree of stress depends on how each person perceives their capability to handle the situation. In general, individuals experience a high level of stress in situations in which they have little or no control and low stress in situations in which they have control or think they have control. Most stress that we experience is caused by the little frustrations in life: a broken shoe string or broken heel, a stubbed toe, a discourteous driver, not being able to find a parking place, being late for an appointment, or misplacing a file. A particularly "bad day", with several of these frustrations occurring, can result in a highly stressed individual. There are two types of stress that can degrade flight performance. These are acute stress and background stress.

1. Acute stress. This stress is the overload that occurs in a highly intense event such as an argument or flying a difficult approach. Performing a nonstandard cockpit procedure can produce acute stress. Acute stress can result in several negative consequences such as:

    a. Tunnel vision - the restriction of attention to only part of the task.

b. Rigidity of response - maintain a single course of action even though conditions have changed.

c. A tendency to scan alternatives less effectively during decision making.

d. Ballistic decision making - making decisions without thinking through the consequences of the decision. This one can be a killer.

2. Background stress. These are the stress factors that are in our every day activities, such as career discontent.

H. CRM Training

As stated earlier, CRM focuses on crew interaction. Two out of three accidents are attributable to flight crew error. Of these accidents, there was nothing mechanically wrong with the aircraft. Over the years engines and other aircraft components have become more reliable therefore accidents caused purely mechanical failures have declined. Today, with crew performance being the most significant threat to aviation safety, the aviation industry and the Coast Guard have responded with an ambitious program to train air crews in effective coordination and performance.

I. Conclusion

This chapter only touched on the concepts and terms of CRM. There are many opportunities for CRM training provided by the Coast Guard in flight safety presentations by the air stations, the FAA in the seminars conducted throughout the country and by conducting training at unit levels.

Chapter 6 CREW RESOURCE MANAGEMENT (CRM)

A. BACKGROUND

1. Crew Resource Management (CRM) was originally known as 'Cockpit Resource Management'. CRM deals with resource management in flight operations. It is defined as the effective utilization of all available resources. Resources include autopilots, other avionics systems, operating manuals, and people, including crewmembers, air traffic controllers, and others in the aviation operating environment.

2. Human error continues to be the single largest causal factor in aviation accidents. Current statistics indicate that 70-80% of all aviation accidents are attributable to human error. Although this manual cannot cover all of the facets of CRM, some highlights are presented. Mounting accident/incident data suggests that while superior airmanship is an essential component of what we do, it is insufficient in and of itself to assure flight safety. Safe and efficient Auxiliary flight operations depend on teamwork and understanding of human behavior. A good reference is the FAA Advisory Circular 120-51B. The goal of CRM is to improve individual and crew performance by using all the resources available to minimize the risk. Some of the indicators are:

   a. Situational Awareness

   b. Stress and performance

   c. Decision Making

   d. Attitude and Crew performance

   e. Effective Communication

   f. Information Processing

3. Information on current developments in CRM can be obtained on the internet at: http://www.caar.db.erau.edu/crm/

4. The principles of CRM shall be used in the Coast Guard Auxiliary aviation program. These principles apply even in the single pilot environment by using all available resources both in the cockpit and on the surface. The human factor is the single most important element for safe and effective aircraft operations. An understanding of CRM will help the pilot to better utilize the crew and at the same time will help the crew to understand that they must take an active part in the operation of each flight.

B. CRM STUDY

1. This study emerged from the circumstances surrounding the crash of a DC-8 on approach to the Portland, Oregon International Airport on 28 December 1978. The investigation revealed that the captain, a pilot with over 27,000 flight hours, 5,500 hours in type, lost "situational awareness" while attempting to resolve a minor problem with the landing gear. This loss of situational awareness, manifesting itself in the captain's disregard for the input from his first officer and engineer, resulted in the aircraft running out of fuel six miles from the airport. Based on their investigation, the National Transportation Safety Board (NTSB) issued the following statement:

    Probable cause: Failure of the captain to monitor the aircraft fuel state, to respond to the low fuel indications, and his failure to respond to the crewmembers advisories regarding the fuel state. Contributing to the accident was the failure of the other two flight crewmembers to either fully comprehend the critical nature of the fuel state or to successfully communicate their concerns to the captain.

    Safety recommendation: Encourage all commercial air carriers to have their flight crews indoctrinated in the principals of flight deck resource management with particular emphasis on the merits of participatory management for captains and assertive training for other cockpit crew members. As a result of the investigation and the recommendation of the NTSB, that airline, and three other airlines, immediately started presenting CRM training to their flight crews. In addition, a spin-off training called Line Oriented Flight Training (LOFT), also was derived. LOFT training is accomplished in simulators where flight crews are confronted with emergencies, or other situations that require and measure their ability to interact effectively to resolve problems.

2. The three key concepts in the above study are:

    a. Participation by all crewmembers in all aspects of the flight.

    b. All crewmembers should have an understanding of the basic elements for safe flight.

    c. Crewmembers should be able to communicate effectively within the flight environment.

C. CRM CONCEPT

1. Performance: Effective performance depends on both technical performance and interpersonal skills.

2. Focus: CRM focuses on crewmember attitudes and behaviors. A primary focus of CRM is effective team coordination. The team encompasses the flight crew, air

traffic controllers, maintenance, and other groups that interact with the cockpit crew. Effective CRM involves the entire flight crew. CRM is not simply the responsibility of the pilot in command, nor should CRM be viewed as pilot training. All crewmembers are responsible for the effective management of the resources available to them.

3. Acquisition of CRM skills: The acquisition of effective CRM skills requires the active participation of all crewmembers. Effective resource management skills are not gained by passively listening to classroom lecture, but by active participation and practice on each flight.

4. Motivation of crewmembers: The pilot in command must maintain a positive climate on the flight deck and encourage crewmembers to fully participate in crew activities. Creating the proper climate is important. This can be done by maintaining an "open" cockpit atmosphere, having the crewmembers speak up when things do not seem right, or ask questions if they do not understand. It is up to the pilot in command to promote positive relations by providing non-punitive critique and feedback.

5. Assertiveness: Assertive behavior indicates highly developed skills in both task and relationship and is most likely to produce an assertive response from other crewmembers and insure the open exchange of information. As a pilot in command, you have the authority to either accept or reject the advice or opinion of others. Listening and responding to your flight crew does not mean abdicating command.

D. RULES

1. These rules were primarily developed for the flight deck of an air carrier, but the principles are valid for the Auxiliary aviation environment that will probably be a pilot and one or two observers or air crew. The basics are as follows:

   a. In abnormal situations, the first order of business must be to decide who flies the aircraft and who monitors or works on the problem.

   b. Positive delegation of monitoring duties is as important as positive delegation of flying duties.

   c. The pilot flying must not attempt to accomplish secondary tasks during busy portions of a flight.

   d. Whenever uncertainty or conflicting opinions of fact occur, such as a misunderstood radio transmission, the conflict must be resolved unequivocally using external sources of information. (For example, request a repeat of the transmission.)

e. If any crewmember has doubts about a clearance, procedure or flight condition, he or she is obligated to make that doubt known to other crewmembers.

f. Distractions should be minimized especially during key parts of the flight. A sterile cockpit concept (no conversation) should be enforced during take off and landings. No cross conversation when outside communications are being transmitted.

g. The use of checklists is to be mandated. The occupant of the right seat should read the checklist to the pilot.

E. RESPONSIBILITIES

1. The pilot in command of an Auxiliary aircraft is responsible for the safe and orderly conduct of the flight. This responsibility and authority exists from the time the pilot begins flight/mission planning until completion of the flight. It is imperative that flight crewmembers be aware of the authority of the pilot in command and be ready to comply quickly with his/her instructions. The successful completion of the mission or the safety of the crew may be jeopardized if the scope of this authority is not clearly understood.

F. CONCLUSION

1. CRM starts prior to the flight. The concept should be developed at Coast Guard Auxiliary aviation safety workshops. The next step is for the pilot to review CRM at the pre-flight briefings. Have the crew participate in pre-flight aircraft system checks. Go over emergency procedures as well as standard operating procedures. Clarify the roles of all crewmembers for each aspect of the flight.

2. The next step takes place during the flight. Practice what was learned on the ground.

3. The final step takes place at the post flight wrap up. What could have been done differently? What procedures should be changed next time? What went well with the flight?

CRM is one of the MANDATED topics at the REQUIRED annual Coast Guard Auxiliary aviation safety workshops.

CHAPTER 6 TECHNIQUES OF OBSERVATION

A. Search Observers

1. For SAR and patrol activities, the real payload for the search aircraft is the observer. While the pilot is a contributor to the observations, his main task is to safely control and navigate the aircraft. The effectiveness of the search or patrol team can be no greater than the effectiveness of the observer.

2. Effective and efficient observation requires training and experience. Observer scanning techniques must be accomplished in a systematic way to assure a high degree of coverage of the search or patrol area. Observers must know what to look for. Objects usually look different from the air than they do from the surface. Moreover, if a crash or sinking is involved, the objects of the search will usually be quite different from the original subject of the search. In addition, once the search object, or suspected search object has been sighted, the observer must know how to retain surveillance of the object while communicating its relative position to the pilot so that the aircraft can be maneuvered into a more advantageous position.

B. Observer Sector Assignments

1. The pilot will usually be provided instructions on the assigned search pattern to be flown. If not, he will determine a pattern including leg directions and track spacing. Based upon the pattern selected, the visibility from the aircraft and the number of observers aboard, specific relative sectors must be assigned to each observer.

2. Auxiliary aircraft are usually light aircraft with one or two engines and seats for 2-6. In two place aircraft, the seats may be tandem (one behind the other) or side-by-side. For tandem seating, the pilot will usually be in the front seat. In this arrangement, the pilot will have to cover the area directly ahead of the aircraft. The rear seat observer should be assigned to cover both sides alternately.

3. In a side-by-side two place aircraft, the pilot will need to cover the left side of the aircraft as well as observing ahead for aircraft control purposes. The observer in the right seat should also be assigned to scan ahead of the aircraft as well as the right side (see figure 6.1).

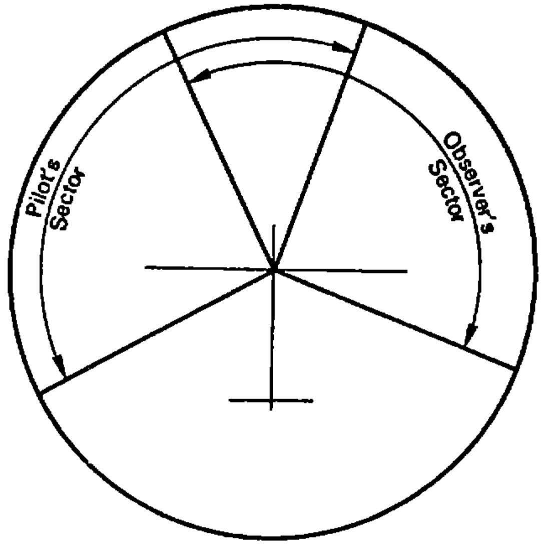


Figure 6.1

4. Many four place aircraft will be operated with two or three persons on board. When only two persons are on board, coverage will be the same as for a two place, side-by-side aircraft. When three persons are on board, the observer in the rear seat should be assigned the position behind the pilot. His search sector should cover as much of the left side of the aircraft as possible. In high wing aircraft, this can be a sector approaching 180 degrees. In low wing aircraft, the observer in the rear seat will only be able to search of the wing effectively. If the piloting duties are to be shifted between occupants of the two front seats, loading of the aircraft should permit the rear-seat observer to cover

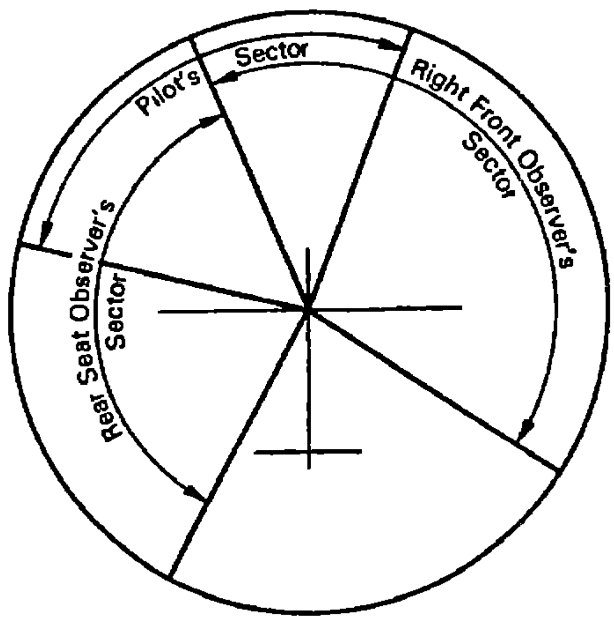


Figure 6.2

either side by shifting position also. The front seat observer, when only one observer is available for the rear seat, will cover the side opposite the pilot as discussed above for a two place, side-by-side aircraft (see figure 6-2).

5. When all four seats are utilized in a four place aircraft, the observer in the right rear seat will cover the right side of the aircraft described for the left rear seat observer above. The right front seat observer will cover the sector forward of the wing in a low wing aircraft. For a high wing aircraft, this coverage can extend further. A satisfactory assigned limit might be dead abeam; or otherwise assigned based on the configuration of the aircraft structure. Some overlap of coverage between the front and rear seat observer can be beneficial in the search (see figure 6.3).

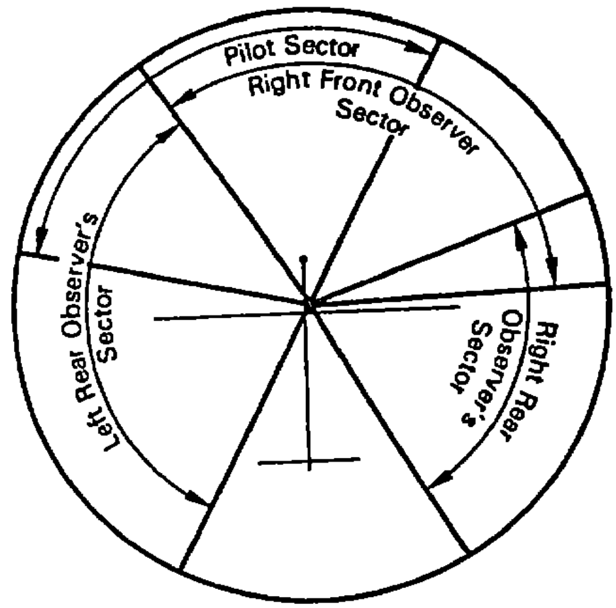


Figure 6.3

6. For aircraft facilities having more observer positions, sectors should be assigned depending upon position visibility. The sectors will overlap, but, this is not objectionable since it will allow alternate rest periods and improve probability of detection.

C. Airframe Obstruction To Visibility

1. Although aircraft are excellent search platforms because of their altitude advantage and mobility, most small civilian aircraft have some obstructions which limit scanning sectors. This varies with the design of the aircraft and the observer's position. Generally, it will be much more severe in low wing aircraft than in high wing aircraft. The pilot should evaluate his particular aircraft and inform his observers of the limitations and how best to compensate for them. To determine pilot and observer visibility obstruction (masking), the following techniques can be used:

a. With the aircraft sitting on the ground, adjust the aircraft to approximately the pitch attitude that is used for search. It may be necessary to place the nose wheel on a block to attain this attitude and the tail of conventional gear aircraft will have to be elevated.

b. Calculate the distance of the pilot/observer's eyes above the ground when in the normal seated position.

c. Mark a position on the ground directly below the pilot/observer.

d. Establish a line on the ground through the above position which parallels the roll (fore-aft) axis of the aircraft.

e. Have someone mark a series of positions on the ground to outline the masking by the aircraft structure of the view of the ground from the pilot/observer position.

f. Measure the right angle distance from these marks to the fore-aft line and measure the distance from that intersection back to the mark immediately below the pilot/observer.

g. Transfer these measurements to a piece of graph paper and connect them together to form a visual representation of the masking.

3. Knowing the height of the pilot/observer's eyes above the ground and the distances of the masking on the ground, it is possible to compute the equivalent distances that are blocked from view at different altitudes. Example: If the height of eye is 6 feet above the ground and the closest veiw over the nose is 30 feet, then when the aircraft is in level flight at 500 feet altitude, everything closer than 2500 feet in front of the aircraft is blocked from the pilot's view (see figure 6.4). (30:6 = 5 X 500 = 2500).

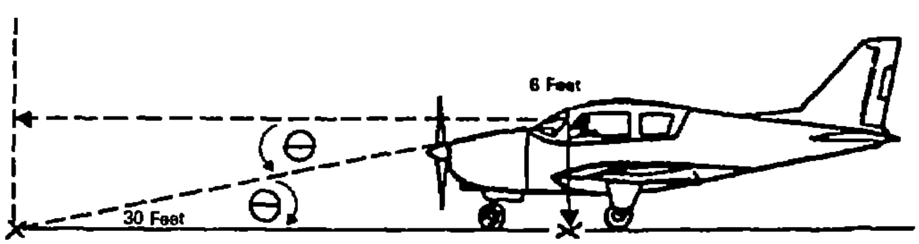


Figure 6.4

4. What comes out of such a procedure is a diagram that looks essentially like the following (figure 6.5):

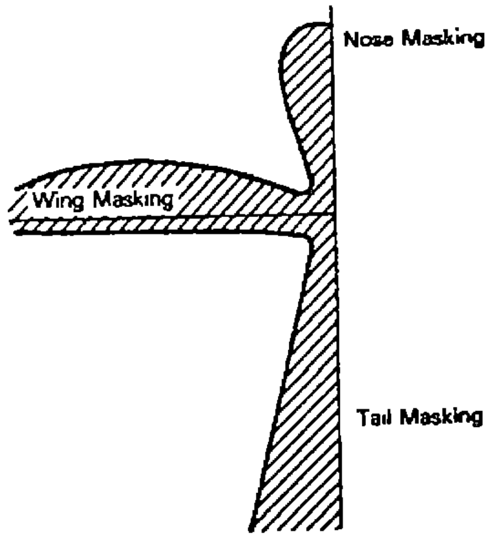


Figure 6.5

D. Observer Tips

1. The speed of the aircraft affects the efficiency of the observers by reducing the time in which they can scan a given sector of the surface. In searching, the slower the speed of the aircraft, the greater is the probability of visual detection.

2. Binoculars rapidly bring on eye fatigue in aircraft and should be used only to check sightings made by the naked eye. Gyro-stabilized binoculars are preferred.

3. When searching at low altitudes, the area closest to the aircraft (where detection probabilities are highest) will be passed quite rapidly. The rapidity with which this area will pass is dependent upon the masking caused by the design of the aircraft and by the speed of the aircraft. Low wing aircraft present a particular problem in this regard. For a moderate speed low-wing aircraft with considerable masking, it may be necessary for rear seat observers to scan only the area in view behind the wing in order to obtain maximum effectiveness.

4. Most searches by Auxiliary aircraft facilities are apt to involve search over water. Usually, over water searches will provide little or no contrast. Under these conditions the observer's eyes may focus short of the surface without the knowledge of the observer, and thus compromise the thoroughness of the search. To preclude this danger, observers should occasionally focus their eyes on some specific items on the surface such as whitecaps or debris. If none is visible,

the eyes should be focused periodically on some part of the aircraft such as the wing tips. A short "focusing" period of a second or so will overcome this problem and scanning can be resumed.

5. Motivation is a highly important factor that will affect the performance of a search crew. During the early stages of and search, motivation is high. Only after fatigue sets in and hope of locating survivors fades does maintenance of high motivation become a problem. Every effort must be made to maintain a high degree of motivation in the search effort to avoid the tendency of the crew just to "go through the motions".

E. <u>Scanning Procedures</u>

1. Although the human eye can "see" over a wide angle, it focuses sharply only over an angle of about 10 degrees.

2. This means that the detection of a hard-to-see target will usually occur within about 5 degrees of the central position point for the eye. Practically speaking, you must "be looking right at an object" to really see it. Moreover, the scan of the eye must be "stopped" for effective sharp vision. For these reasons, observers should scan their assigned sectors with discrete movements of the eye. Each movement should be about 3 or 4 degrees. The rate of movement should be two or three shifts per second. To make one scan across a 90 degree sector will take about 10 to 15 seconds.

3. The search of an assigned sector should start close to the aircraft and should sequentially move outward from the aircraft in units of 3 or 4 degrees after each horizontal scan. Consecutive scans should be in opposite directions. That is, start the first scan from left to right, move up, make the second scan from right to left, move up another 3 to 4 degrees and scan back from left to right again. Continue this sequence to the horizon, or to the limit of meteorological visibility or to a predetermined upper limit.

4. For the pilot and front seat observer, the scanning should be repeated again by returning the eyes for sequential sweeps starting close to the aircraft. This technique helps compensate for the changes in view caused by the aircraft's forward motion and insures optimum coverage of the close in area. When flying at low altitudes searching for small objects (such as a life raft, or personnel in water), rear seat observers should employ a similar technique. In such cases, both front and rear seat observers should limit their outward scanning. When searching for personnel in the water, this limit should be set at about 1/2 the track spacing for the aircraft at 500

feet. (e.g. For persons in the water, using .25 NM track spacing, the limit should be .125 NM or approx. 250 yards.) For life rafts, the limit should be 2.5 miles or less, and for boats under 60 feet in length, 10 nautical miles or less (even though the horizon may be over 25 miles distant for an aircraft at 500 feet altitude). Thus for small objects, even under optimum conditions, no search should be made above 10 degrees below the horizon and for rafts, no more than 2 degrees below the horizon. For boats up to 60 feet, the scan will extend virtually to the horizon. If the meteorological visibility is less than optimum, these distances should be further reduced.

F. Vessel Recognition

1. A knowledge of various vessel types and configurations is important the observer. In order to provide accurate reporting it is critical that the vessel be identified and described properly by the reporting aircraft. Most Auxiliarists acquire a working knowledge of the plan view of various surface craft through the public education courses, through member training and through experience on the local waters (see figures 6.6 thru. 6.9).

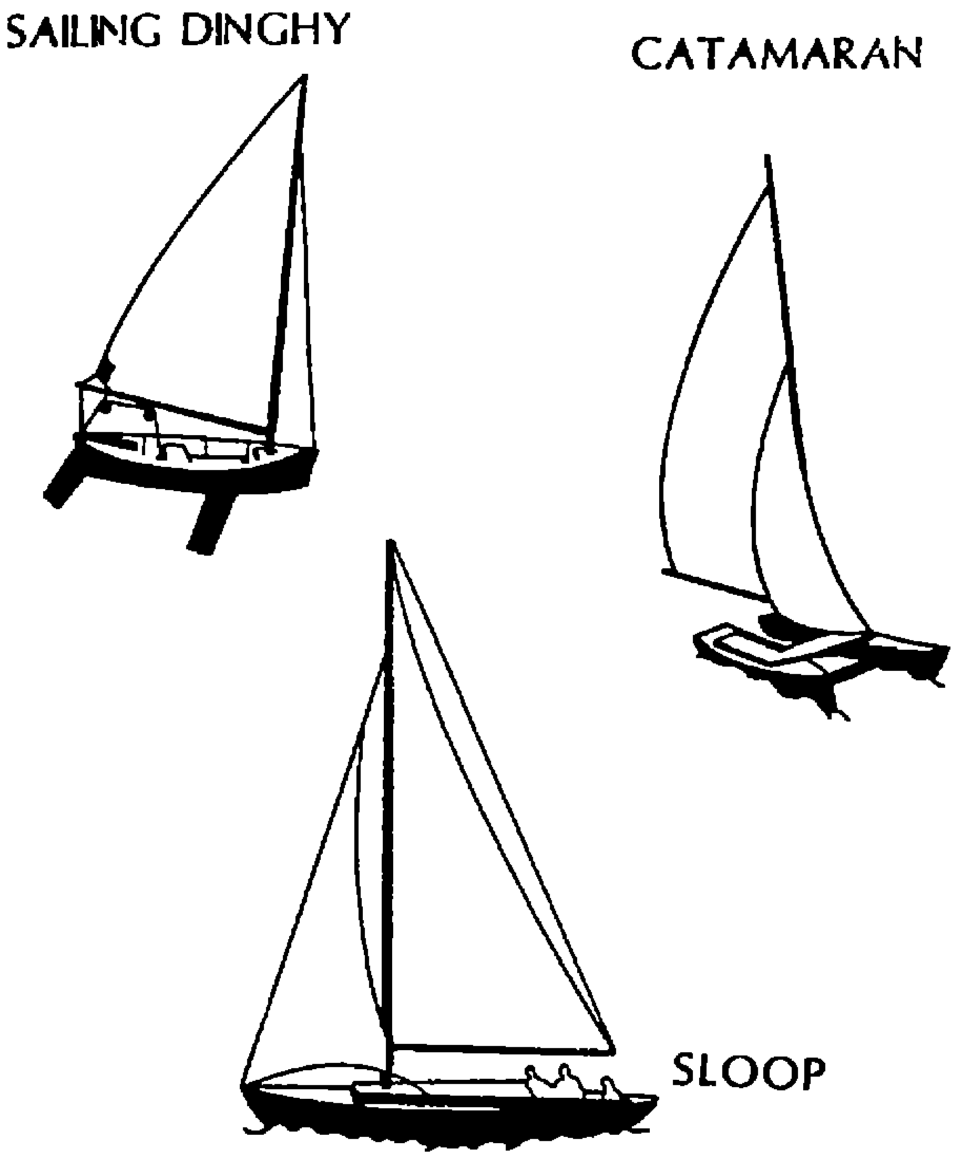


Figure 6.6

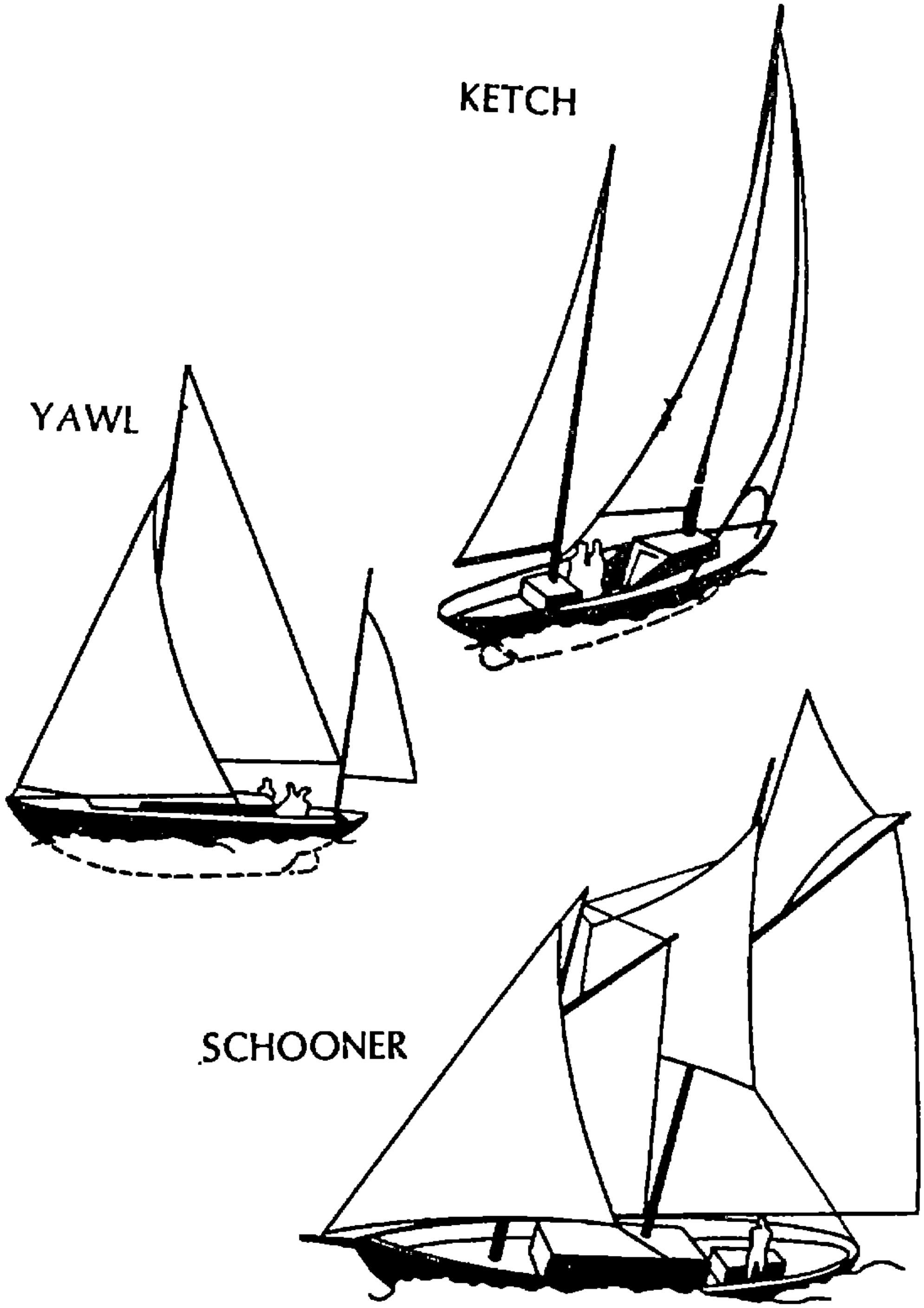


Figure 6.7

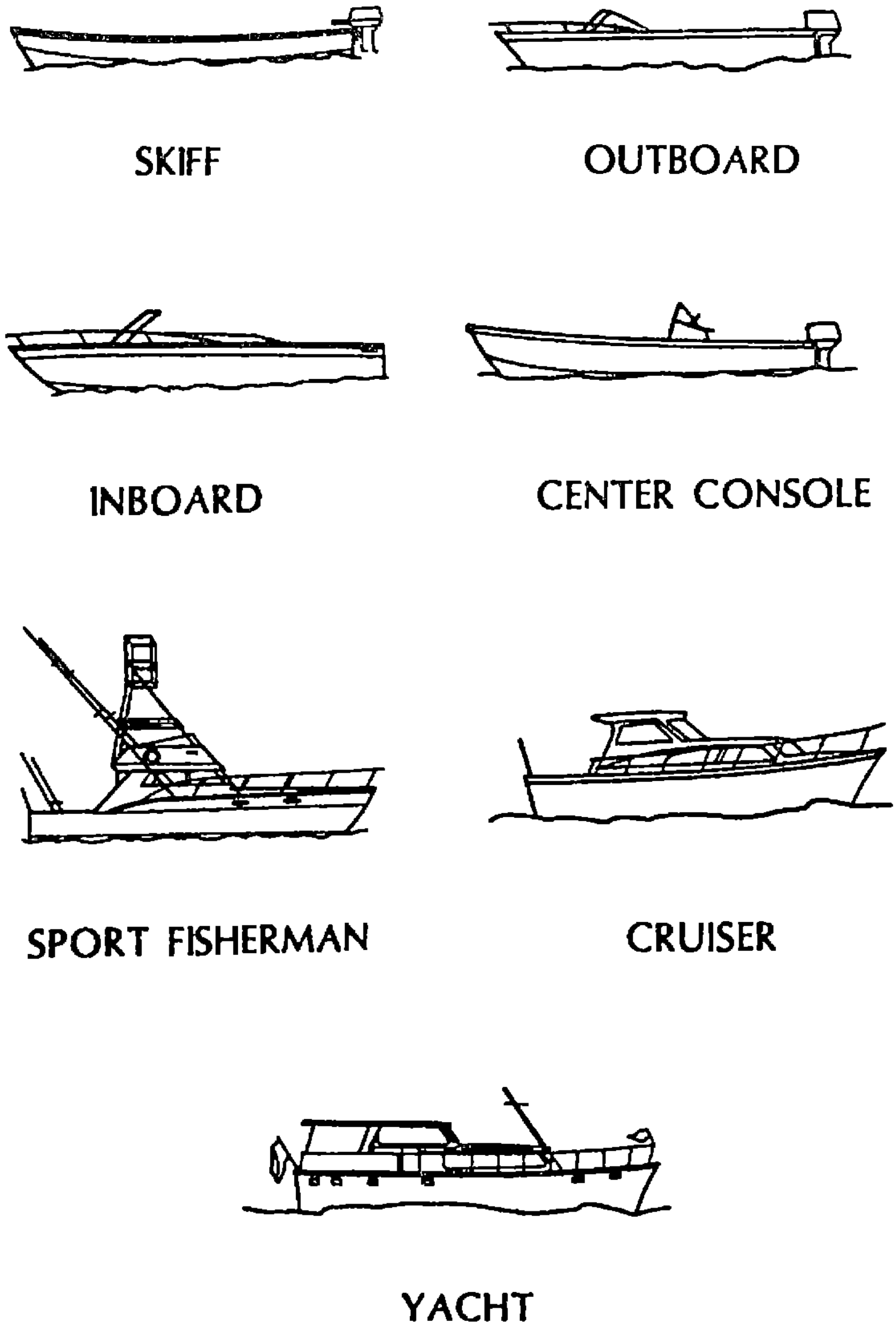
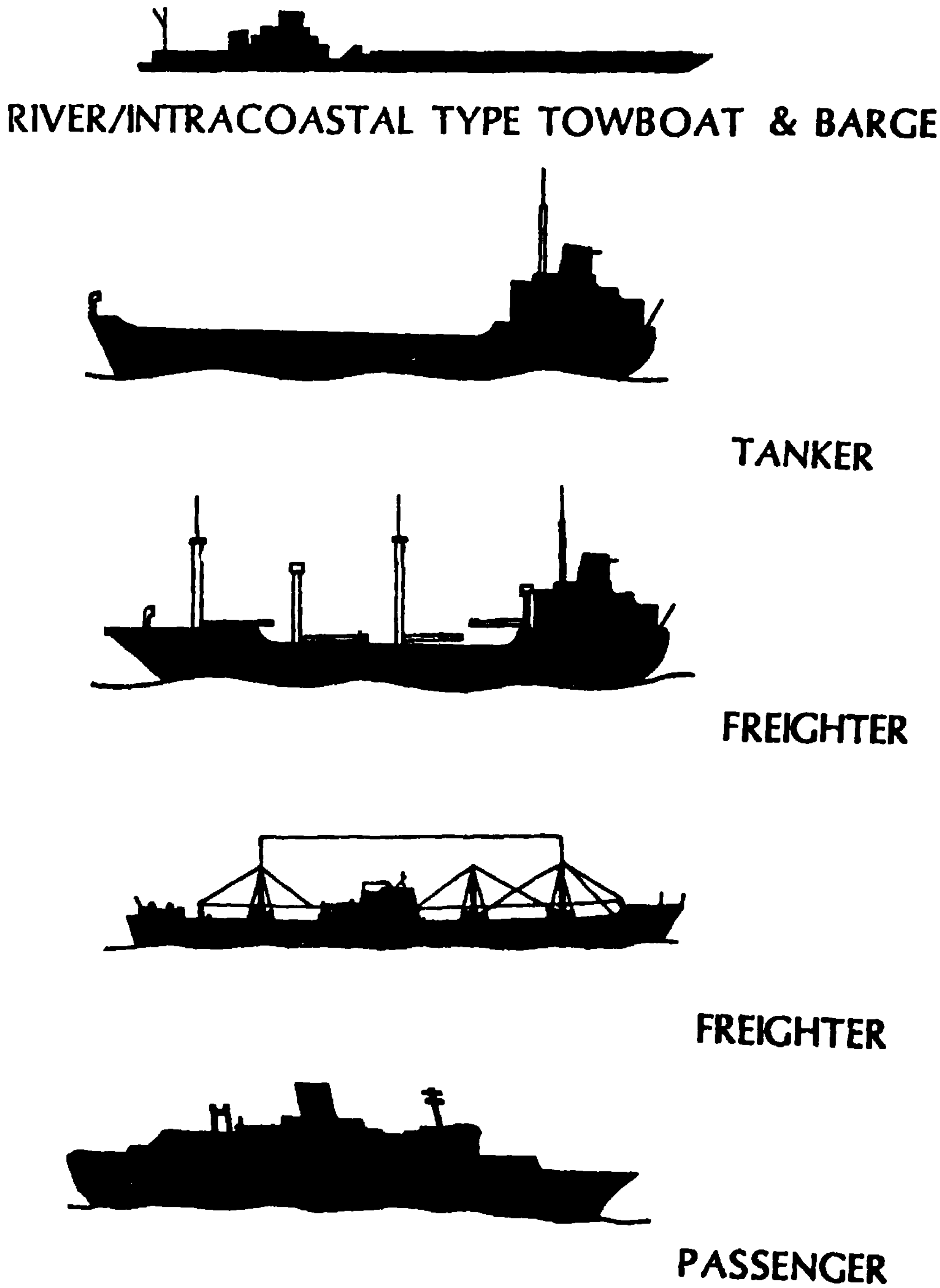

SKIFF
OUTBOARD
INBOARD
CENTER CONSOLE
SPORT FISHERMAN
CRUISER
YACHT

Figure 6.8



RIVER/INTRACOASTAL TYPE TOWBOAT & BARGE
TANKER
FREIGHTER
FREIGHTER
PASSENGER

Figure 6.9

G. Sea State Evaluation

1. The simplest method of estimating wind direction and velocity is to examine wind streaks on the water. These appear as long streaks up and down wind. Whitecaps fall forward with the wind, but are overrun by the waves, thus producing the illusion that the foam is sliding backwards. Knowing this, and by observing the direction of the streaks, wind direction is easily determined. Wind velocity can be accurately estimated by noting the appearance of whitecaps, foam, and wind streaks. Wave height is estimated as a function of wind velocity (see table 6.1).

BEAUFORT SCALE	WIND (knots)	SEA INDICATIONS	WAVE HEIGHT (feet)
0	calm	Mirrorlike	0
1	1-3	Ripples with appearance of scales.	1/4
2	4-6	Small wavelets, glassy appearance, do not break.	1/2
3	7-10	Large wavelets; some crests begin to break. Scattered whitecaps.	02
4	11-16	Small waves, becoming longer; fairly frequent whitecaps.	04
5	17-21	Moderate waves, pronounced long form, many whitecaps.	06
6	22-27	Large waves begin to form; white foam crests are more extensive, some spray.	10
7	28-33	Sea heaps up; white foam from breaking waves begins to be blown in streaks along the direction of the waves.	14
8	34-40	Moderately high waves of greater length; edges of crests break into spindrift; foam blown in well-marked streaks in the direction of the wind.	18
9	41-47	High waves. Dense streaks of foam; sea begins to roll; spray affects visibility.	23

BEAUFORT SCALE	WIND (knots)	SEA INDICATIONS	WAVE HEIGHT (feet)
10	48-55	Very high waves with overhanging crests, foam in great patches blown in dense white streaks. Whole surface of sea takes on a white appearance. Visibility affected.	29

Table 6.1

CHAPTER 7 COMMUNICATION PROCEDURES

A. General

1. Communications of some sort between an assisting Auxiliary aircraft facility and surface units are a vital necessity if the aircraft assistance is to be effective. The communication may be with the vessel being assisted, an assisting surface vessel, or both. The communication may consist of simple aircraft and surface maneuvers, surface manual signals, radio, or a combination of techniques. Regardless of the methods used, the assistance will often be reduced in effectiveness or even nullified if some sort of workable communications between the surface vessel and the aircraft cannot be established. In the case of a surface vessel being assisted, the personnel on board may have little or no knowledge of how to communicate with the aircraft. Therefore, considerable ingenuity and patience on the part of the aircrew may be necessary to establish a degree of effective communication.

B. Visual Communication

1. Very often, only visual methods will be available for communications with vessels on the surface. This is particularly true during a patrol or search where the surface vessel is attempting to pass the message assistance is needed, or must help the aircraft single him out as the object of the search among a number of vessels located in the general search area. Aircraft crews should be alert to a variety of possible signals from the people on the surface to help in this identification, including:

   a. Body signals where one of the crew members of the unit in need of assistance faces in the direction of the aircraft and raises and lowers his arms (see figure 7.1).

Wave Arms

Figure 7.1

b. Use of a circle and square signal on a hoist, or a black square and black circle on a flag with an orange background (see figure 7.2).

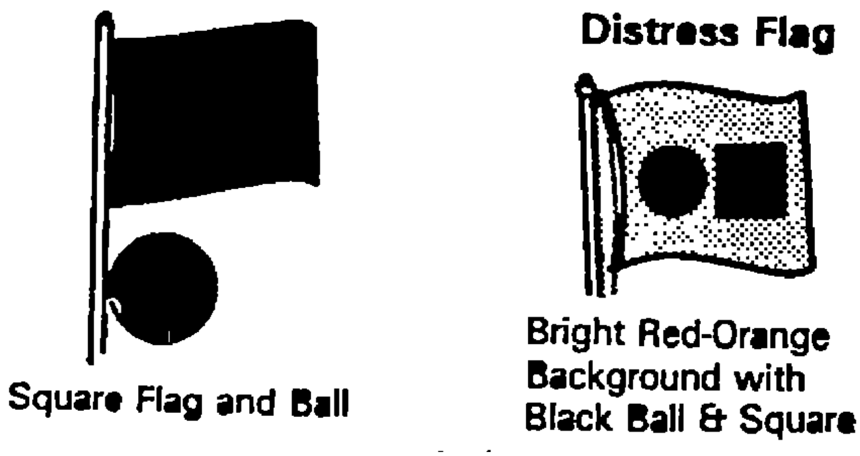


Figure 7.2

c. Smoke or fire from a surface vessel. It may be from burning oil or oily rags in a can and can be detected from a considerable distance (see figure 7.3).

Figure 7.3

d. Pyrotechnics. Flares and meteors from the surface as well as smoke (see figure 7.4).

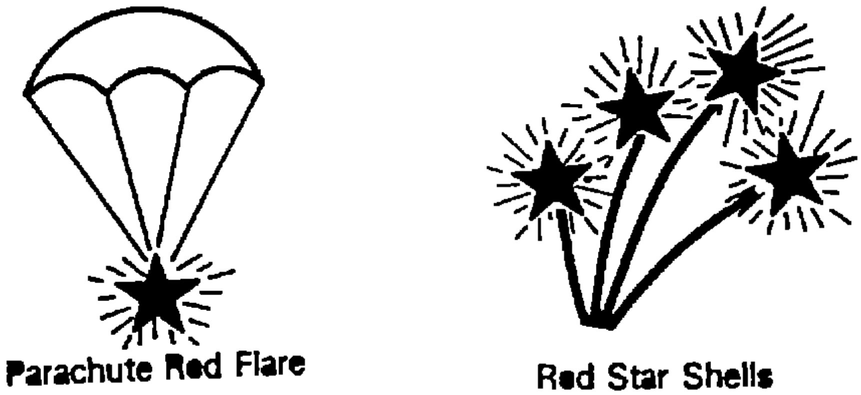


Figure 7.4

e. Dye marker on the water (see figure 7.5).

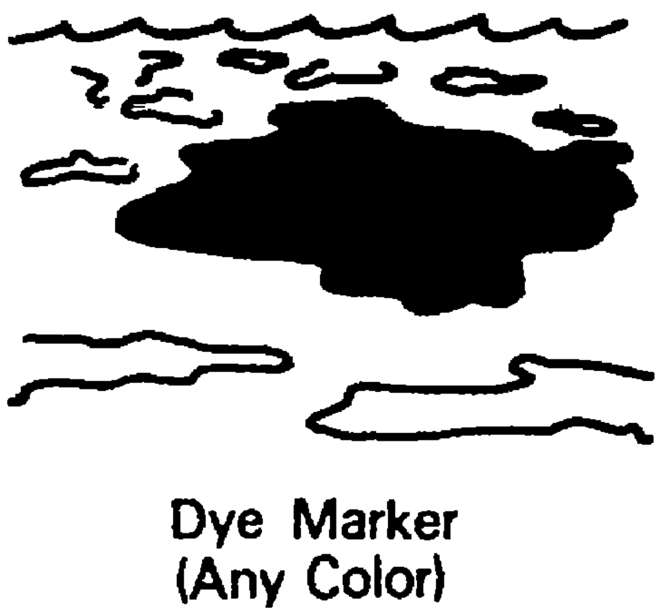


Figure 7.5

2. Another requirement for visual communication may arise when the aircraft desires to direct a surface vessel. This may occur when the aircraft is attempting to guide a surface vessel away from danger. The below illustration of the Aircraft Emergency Procedure for Attracting Surface Craft was originally produced by the Treasury Department in 1953 as form, CG-3488. It may be used as the basis of non-verbal communications with surface vessels. The Coast

Guard and the Coast Guard Auxiliary have been providing copies of the CG-3488 to boat operators for many years. Thus, Auxiliarists can be expected to understand the maneuvers, and many members of the boating public will recognize them. In any event, they will probably be understood even if the surface vessel crew has not been exposed to the CG-3488 although repetition may be necessary (see figure 7.6).

Aircraft Emergency Procedure for Attracting Surface Craft

The Following Procedures Performed in Sequence are Employed by Aircraft to Direct a Surface Craft Towards an Aircraft or Surface Craft in Distress:

1. Circling the Surface Craft at Least Once;
2. Crossing the Projected Course of the Vessel Close Ahead at a Low Altitude, Rocking the Wings or Opening and Closing the Throttle or Changing the Propeller Pitch;
3. Heading in the Direction in Which the Surface Craft is to be Directed;
4. Repeating if Necessary.

When Assistance of the Surface Craft to Which the Signal is Directed is No Longer Required, Aircraft Performs Following Procedure:

1. Crossing the Wake of the Vessel Close Astern at a Low Altitude, Rocking the Wings or Opening and Closing the Throttle or Changing the Propeller Pitch.

Normally a Change or Heading Will be Made by the Surface Craft as an Acknowledgement that the Direction Has Been Received and Will be Complied With. If the Surface Craft is Unable to Comply it Will So Indicate by Hoisting the International Flag "N" or by Other Visual or Radio Means

****** To be Posted at Conning Station ******

Dept. of Transp., USCG, CG-3488 (Rev. 2-75) GPO 956-450

Figure 7.6

C. <u>Directing A Surface Vessel Without Radio Communications</u>

1. To initiate this request for assistance, the surface vessel is circled at least once. Additional circling may be necessary to obtain the attention of the surface crew. This can be verified when members of the surface crew are observed to be watching the maneuvers of the aircraft.

2. After circling the vessel at least once, the aircraft is flown across (perpendicular to) the vessel's projected course while opening and closing the throttle, rocking the wings or cycling the propeller pitch. Next, the aircraft is flown outbound in the direction that the surface vessel is to take. If the surface vessel does not respond, the procedure should be repeated.

3. The surface vessel should also be observed for signals indicating that he cannot or will not accept the directions. Be alert for other signals such as a wave-off or the surface to air signal for "negative."

4. Another possible signal for a vessel to indicate "no" when underway might be to swing the bow of the vessel left and right in the manner of the aircraft maneuver of "Negative". Obviously, if the surface vessel displays no reaction or response to repeated attempts to signal him, this should be accepted as tacit refusal of the directions, and other available means of obtaining the desired action should be pursued.

5. When a surface vessel does accept the directions, he will do so by picking up the desired heading. As the aircraft will be traveling at a much higher speed, it can circle back to the vessel periodically and pass him close by while flying in the direction of the desired course. This technique can be used to verify that the correct course is being followed and/or for indicating corrections in the course for the surface vessel. When the target seems to be in visual range of the assisting vessel, the aircraft then circles the target to serve as reference to the surface vessel. This same technique can be used to steer a vessel around an unseen hazard. The aircraft should circle a way point until the vessel arrives then indicate a new course.

6. If the conditions change during the operation, the vessel is free from danger, or other reasons develop so that the aircraft no longer desires the surface vessel to follow the course indicated, the aircraft should be flown close astern of the surface vessel at low altitude while changing the engine sound (by throttle or prop control) or rocking the wings until the vessel indicates understanding of the cancellation. The aircraft is then free to break contact.

D. Message Drops

1. Message drops are used for communication with surface craft or persons in distress. Aircraft must be certified in writing by the cognizant district commander before deployment of any SAR device such as a drop message. Air crews so certified must practice regularly to maintain proficiency and accuracy in deploying message drops or any other SAR device.

E. Body Movement Signals

1. A somewhat more involved and more flexible method of surface-air communication is the visual body signals system. These signals which were developed for military use are now widely accepted in the civilian community and are found in various aircraft and SAR documents including the Airman's Information Manual, the AOPA Handbook For Pilots, and the Search and Rescue (AUXSAR) Student Text.

2. There are eleven such "standard" signals that can be made by a person aboard a surface vessel, but only eight of these have utility in the typical Auxiliary aircraft area of operations. The signals are simple body position and movement signals and are taught in various Auxiliary training courses. Most often, the signals will be used by an Auxiliary surface facility. However, members of the general boating public may have received instructions in their use or may have a document available which describes the signals and also explains their use (see figures 7.7 and 7.8).

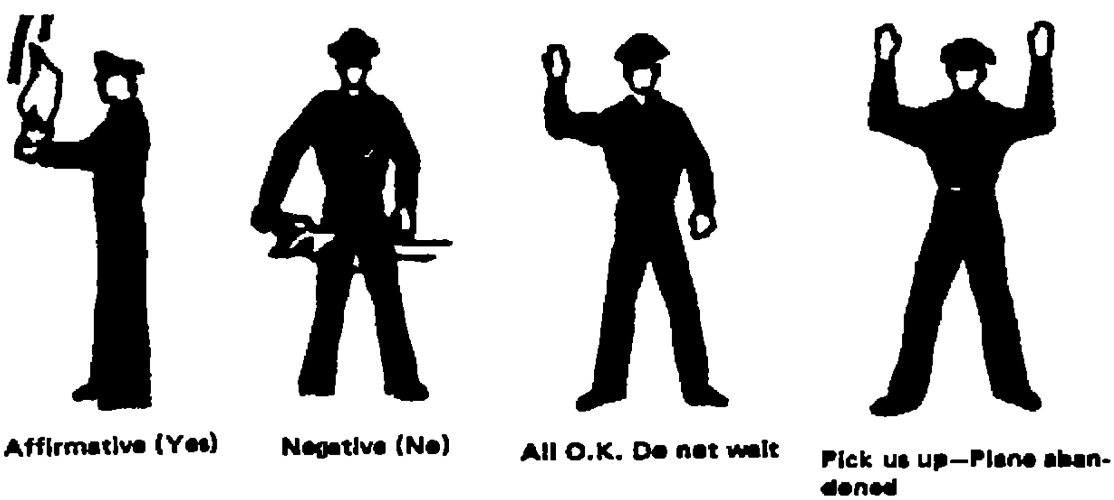


Figure 7.7

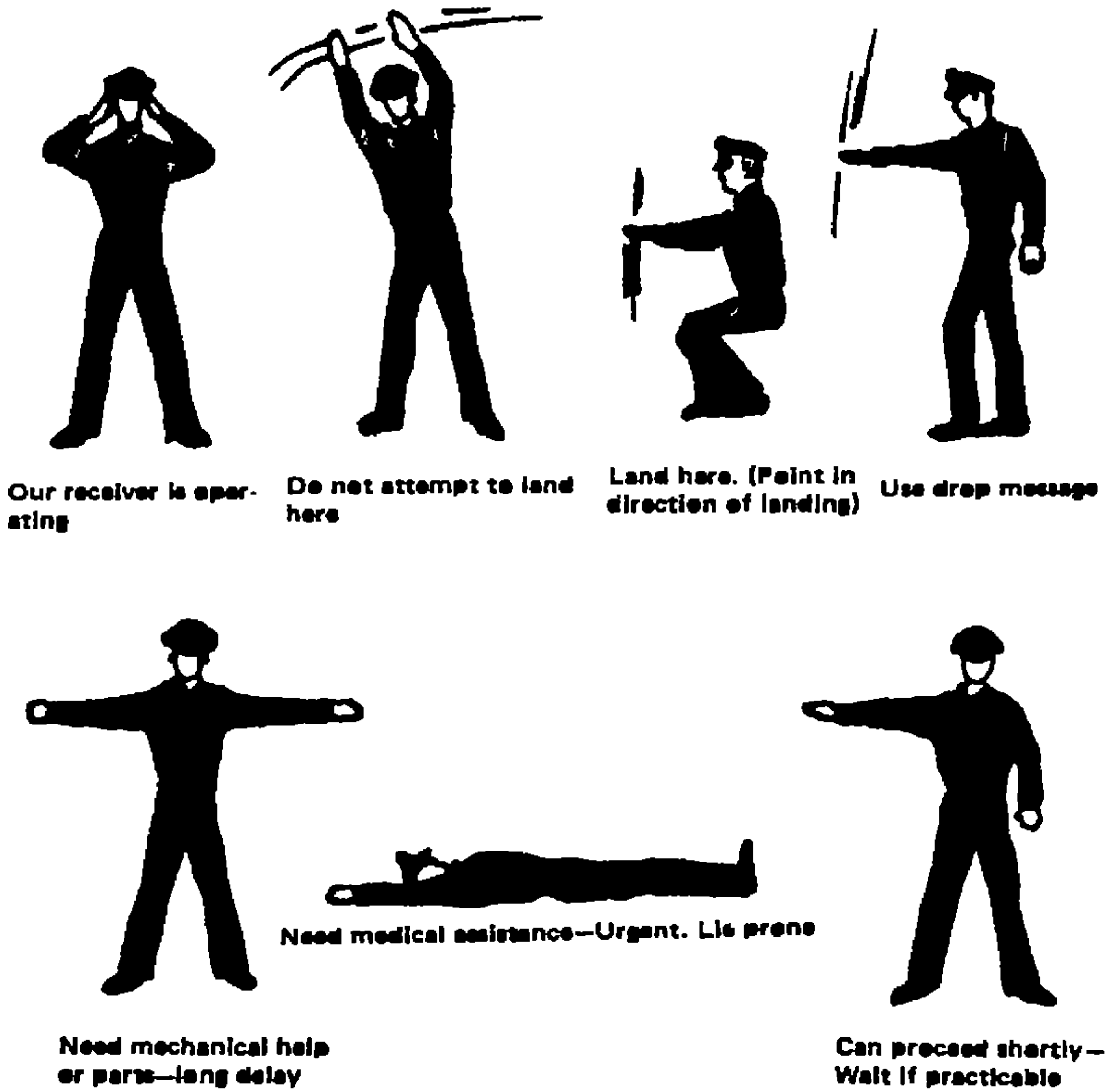


Figure 7.8

3. The aircraft acknowledgment signals shown in figure 7.9 are used to respond to the visual body signals. These body signals are straightforward and simple in their application. The signals used for "message received and understood," "affirmative," and "negative" should be performed smoothly and slowly. Care must be taken in making the signal for "negative" to avoid a skid at slow speed which could develop into a violent stall. The signal can be performed as a series of shallow turns rather than "yawing" the aircraft, thereby avoiding the skid danger.

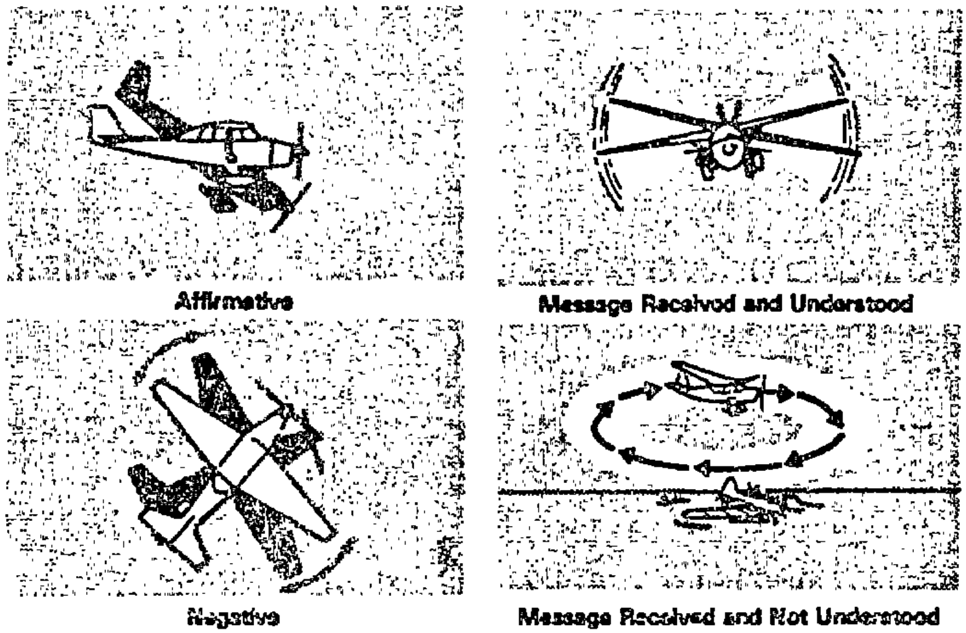


Figure 7.9

F. <u>Ground Emergency Symbols</u>

1. There are recognized emergency communication symbols designed to be used by survivors ashore to impart information to aircraft. These are international symbols and can be found in various publications. Caution should be exercised due to the fact that the accepted symbols were reduced in 1981 by international agreement from eighteen to only five. Many publications are likely to carry the out of date symbols. It is also likely that the older symbols will be used by those who have access to the out of date publications. The new ground-air symbols are in figure 7.10.

V Require Assistance

N No or Negative

X *Require Medical* Assistance

Y *Yes or Affirmative*

↑ Proceeding in this Direction

Figure 7.10

2. The signals may be made by employing strips of fabric, wood, stones, or any material contrasting with the background surface. They may also be marked out in snow or on the ground or sand. Pilots receiving such signals should acknowledge them by rocking the wings of the aircraft.

G. Radio Communication

1. In order to achieve a high degree of communication effectiveness, reliable radio communications between the pilot of the Auxiliary aircraft and the surface vessel operator is needed. This communication can be either direct or relayed from a third party. Communications between the aircraft and aviation ground stations will not be addressed here. Only methods of direct air to surface vessel communications, or specialized relay methods will be covered.

2. Although the Coast Guard does not encourage the use of CB radios, they can be used in an actual emergency if they are available. Even though they are not particularly effective, many surface vessels are equipped with CB radios because they are cheap to purchase. If the aircraft has such a radio (either installed or portable) direct radio communications may be possible where other radio means would not be available. Channel 9 is the CB channel set aside by the FCC for emergency operations, but other channels may be more commonly used by boaters in a specific area. Auxiliary aircraft facility owners who have a CB capability should determine which channel or channels would be most likely to be used in their geographic area of operations. In any use of CB radios by aircraft, it should be remembered that there is no FCC requirement for any licensed station to monitor this emergency channel. The dependability of the citizens band system for effective communications in emergency situations is quite low. Discipline on the CB channels is virtually nonexistent. It should, therefore, be considered supplemental for use by Auxiliary aviators.

H. The Aviation VHF/AM Radio Band

1. Aircraft VHF/AM radios in the 118 - 136 MHz band can be used for air/surface communication, but the usage will usually be limited to pre-planned operations. In this band, only the following frequencies may be used for air/surface communications:

   a. 121.5 MHz - Distress Frequency.

   b. 122.9 MHz - Surface to air and air to air Auxiliary communication exercises.

c. 123.1 MHz - International on-scene SAR working frequency.

2. Only 122.9 MHz should be used unless the units are involved an actual distress or authorized SAR operation. Any surface units transmitting on 122.9 MHz should be properly licensed by the FCC for such transmissions. The only exception is during a SAR exercise where district commander approval to use the frequency has been obtained.

3. VHF-AM frequencies of particular interest to Auxiliary aircrews are:

   a. 121.500 MHz - Distress. This is not used as a hailing frequency as is channel 16 on the marine band. It is reserved for emergency radio traffic only.

   b. 122.000 MHz - Flight Watch. This is a frequency used throughout the country to obtain weather and other flight information.

   c. 122.100 MHz - To communicate with a Flight Service Station an aircraft may transmit on this frequency and listen on a VOR or VORTAC that has voice capability.

   d. 122.800 MHz - UNICOM 1. This frequency is used to communicate with the UNICOM or ground based station, at airfields without a control tower.

   e. 122.900 MHz - Air to ground multi-com. Used for SAR drills. Used as a Common Traffic Advisory frequency (CTAF) for airports without control towers.

   f. 122.950 MHz - UNICOM 3. This frequency is used to communicate with a UNICOM station at an airport with a control tower.

   g. 123.000 MHz - UNICOM 2. This frequency is used to communicate with a UNICOM station at an airport with a control tower.

   h. 123.100 MHz - On scene SAR communications. For use only during actual SAR operations.

   i. 126.200 MHz - Common for all military airport towers that have VHF capability. Also may used for surface to air by Coast Guard ships.

I. Use of VHF/FM Band By Aircraft

1. A minimum of one VHF-FM transceiver is required in all Auxiliary aircraft. The most effective method for air-surface radio communications involving Auxiliary aircraft is by means of a VHF/FM transceiver in the aircraft. Auxiliary aircraft facilities equipped with VHF/FM radios which are operated on Coast Guard Auxiliary missions are considered to be Coast Guard radio stations and do not require FCC licensing for such operation. However, the district commander or his authorized representative must approve such employment. Essential frequencies for Auxiliary aircraft use are:

   a. Channel 16 (156.800 MHz) - International calling and distress.

   b. Channel 21 (157.050 MHz) - Coast Guard working frequency.

   c. Channel 22 (157.100 MHz) - Communication between non-Coast Guard vessels and Coast Guard stations.

   d. Channel 23 (157.150 MHz) - Coast Guard working frequency.

   e. Channel 70 (156.525 MHz) - Digital SelCall-Distress & Calling

   f. Channel 81 (157.025 MHz) - Coast Guard working frequency.

   g. Channel 83 (157.175 MHz) - Coast Guard working frequency authorized for use by the Auxiliary. Not to be used in areas where it will interfere with Canadian users.

2. Other frequencies may be either essential or highly desirable depending upon the specific area or district in which the aircraft will be used.

3. Due to the greatly increased range possible with VHF/FM radios transmitting from aircraft, several special restrictions must be observed by Coast Guard and Coast Guard Auxiliary aircraft:

   a. Aircraft are limited to the use of low power (1 watt) output on the transmitter unless higher power is essential to ensure communication.

b. The frequency, channel 6 (156.300 MHz), Intership Safety, may be used by aircraft for safety purposes only.

c. Aircraft are prohibited from transmitting on any VHF/FM maritime frequency when operating above 3000 feet mean sea level (or mean lake level in the Great Lakes) except in an emergency situation.

d. Channel 83 (157.175 MHz), the Coast Guard Auxiliary working frequency, should be avoided in areas where interference is possible with Canadian radiotelephone users.

J. High Frequency Single Side Band

1. Coast Guard aircraft utilize HF-SSB to communicate air to ground where communications for a considerable distance is required. Due to the physical size of some Auxiliary aircraft, installation of an antenna suitable for HF-SSB may be difficult. Where HF-SSB capability exists, communications can be maintained with Coast Guard cutters, air stations and radio stations over a wide range. The frequency to use changes with time of day, distance between stations, sunspots cycles and atmospheric conditions. All frequencies for Coast Guard use are upper side band. Frequencies of interest to Auxiliary aviators are:

a. 2141 kHz - Working (Alaska only)

b. 2182 kHz - International calling and distress

c. 2261 kHz - Working (48 contiguous states only)

d. 3023.5 kHz - On scene SAR

e. 3120 kHz - Working

f. 3123 kHz - Working

g. 5680 kHz - On scene SAR

h. 5692 kHz - Working

i. 5696 kHz - Working (primary guard by most C. G. Radio Stations)

j. 8980 kHz - Working

k. 8984 kHz - Working (secondary guard by most C. G. Radio stations)

l. 11195 kHz - Working (48 contiguous states only)

m. 11198 kHz - Working

n. 11201 kHz - Working

o. 11201 kHz - Working

p. 15081 kHz - Working

q. 15084 kHz - Working

r. 15087 kHz - Working (48 contiguous states only)

2. The HF-SSB frequencies to be used should be coordinated with the ground based station and other aircraft involved prior to a mission.

K. Basic Radio Procedures

1. Pilots receive training in the basic use of radiotelephone as part of their FAA licensing procedures. No attempt is made here to teach basic radio telephone procedure. The pamphlet "How to use your marine radiotelephone" was prepared by the Radio Technical Commission for Maritime Services and is sold through the Auxiliary National Store. It provides basic instruction in the use of radio telephone equipment as does the Auxiliary Boat Crew Manual (Commandant Instruction M16798.8 (series)) for those who need refresher training. Chapter 6 of this manual provides additional guidance for observers in communications techniques and procedures which are peculiar to Auxiliary aviation operations.

L. Citizens Radio Service (CB)

1. Citizen's band (CB) is a relatively inexpensive form of radio communications. It is not encouraged by the Coast Guard as a primary means of radiotelephone communications for boaters. The band provides 40 channels and transmitter power is limited to 5 watts. Some of the many disadvantages include overcrowding, false signals, no protected emergency channel, and no circuit discipline.

2. The Commandant has authorized the Coast Guard to participate to a very limited extent in the use of CBs to enhance maritime safety. Citizen interface stations, (a CB equipped station that has the capability to directly contact the Coast Guard via radio or telephone) may receive calls for assistance and notify the Coast Guard. Coast Guard units have no responsibility to monitor any CB channels. The following specific guidance is applicable to the Coast Guard's role in using CBs:

a. Normally, Coast Guard use of CB is authorized only when responding to distress calls. These include those made for emergency purposes involving immediate safety of life or the immediate protection of property when no other means of communications exists. Maritime calls of a non-emergent nature should not be answered. Specifically prohibited are requests for radio checks, weather information, or local maritime conditions.

b. Distress calls, other than maritime, which go unanswered should be acknowledged. The information should be promptly relayed to the proper local authorities.

c. Only standard Coast Guard call signs will be used.

d. Voice procedures will be standard Coast Guard radio procedures. A proper Coast Guard Auxiliary image will be maintained and professional standards will not be diluted.

e. Routine CB usage between Coast Guard Auxiliary units is prohibited except under emergency conditions when no other means of communication exists.

M. <u>Formal Messages</u>

1. Each Auxiliarist should have a working knowledge of the various types of messages including single and multiple address messages and special category messages.

2. Several types of messages may be transmitted or received. A proper understanding of messages is necessary if you are to function effectively as a member of an Auxiliary flight crew. For messages originated and transmitted, your concern is that they reach their destination promptly, securely, and accurately. For messages received, the same requirements apply. As a general rule, messages or rapid communications may be subdivided into two broad categories: operational and administrative.

   a. Operational Communications are communications directing or affecting the actual movement of vessels or aircraft or weather and other vital reports affecting the safety of life.

   b. Administrative Communications are communications which deal with routine matters such as personnel or logistic requirements.

3. Formal messages must be released for transmission by individuals designated such authority by the "originator." The originator is the command by whose authority the message is sent. The person who actually composes the message for release by the originator is the "drafter." The originator and the drafter may be the same individual. There are separate responsibilities for originating and drafting a message:

a. Originator's Responsibility.

(1) Determine if a message is necessary. A message is not to be used when another form of communication will suffice;

(2) Determine addressee(s) and type of message; and,

(3) Determine the precedence.

b. Drafter's Responsibility.

(1) Prepare the text of the message making it clear, accurate and brief. Brevity must not be obtained at the expense of clarity or accuracy.

(2) Ensure that the proper format is used for the type of message being drafted.

4. Formal messages consist of three parts: the heading, the text, and the ending. The components of the heading of a radiotelephone message are the "procedure," "preamble," "address," and "prefix." The text of the message is the basic thought or idea the originator wishes to communicate. The ending consists of either the proword "OVER" or "OUT" following the BREAK (BT) at the conclusion of the text.

5. Heading.

a. The portion of the heading referred to as the "procedure" contains message relay instructions which the transmitting station must send.

b. The "preamble" consists of the precedence and the date-time group. A relaying station may not alter or omit the preamble.

(1) Precedence. The first letter in the preamble is the precedence pro-sign. The precedence is assigned to a message by the originator to show the relative order in which the message is to be transmitted. The precedence also indicates to the receiving station the relative urgency of the message and therefore the order in which the message is to be handled. Although a letter designation is used to indicate the precedence, the designation word as listed in table 7.1 is transmitted when the message is sent.

PRECEDENCE	DESIGNATION
Z	Flash
O	Immediate
P	Priority
R	Routine

Table 7.1

(a) FLASH (Z) precedence is reserved for initial enemy contact reports. Flash messages take priority over all other traffic.

(b) IMMEDIATE (O) precedence is used for important messages pertaining directly to operations in progress. Immediate precedence is also used for messages concerning aircraft movements, flight plans, initial surface distress, MEDICO information, hazardous weather (hurricanes, tornadoes, etc.) and other urgent communications. This precedence is only given to operational traffic. Immediate precedence messages are handled ahead of all other traffic except Flash.

(c) PRIORITY (P) precedence is used for search and rescue situation reports (SITREPS), aid to navigation discrepancies, important weather information and urgent administrative matters. Priority messages are handled ahead of Routine messages.

(d) ROUTINE (R) precedence is used for normal operational messages, ship movements and administrative matters requiring rapid transmission.

(2) Date-Time Group. The date-time group is a series of numbers and letters which represent the date and time that the message was completed and released. The date-time group is used for reference purposes. An originator may have only one message with a particular date-time group. The first two numbers indicate the day of the month, the next four represent the time of day in Coordinated Universal Time (UTC) or Greenwich Mean time. This is followed by the letter "Z" which is the designator for Coordinated Universal Time. This is followed by a three letter designator for the month and the last two digits of the year. Coordinated Universal Time is the date and time at the zero meridian of longitude which passes through Greenwich, England. Each 15 degrees of longitude represents one hour difference from UTC. Therefore if you are located in the central time zone which is centered at 90 degrees west longitude you are 90/15 or 6 hour behind UTC. To determine the date-time in UTC you must add 6 hours to your present time. Example: If the date is july 5, 1990 and the time is 8:00 PM or 2000 hrs, you must add 6 hours to find the UTC which is 2:00 AM or 0200 on the 6th. Therefore, the date time group would be 060200Z JUL 90. When a time zone changes to daylight saving, the correction factor must be reduced by one hour. The time 2400

is never used. Midnight becomes 0000 hrs for the next day (see figure 7.11 and table 7.2).

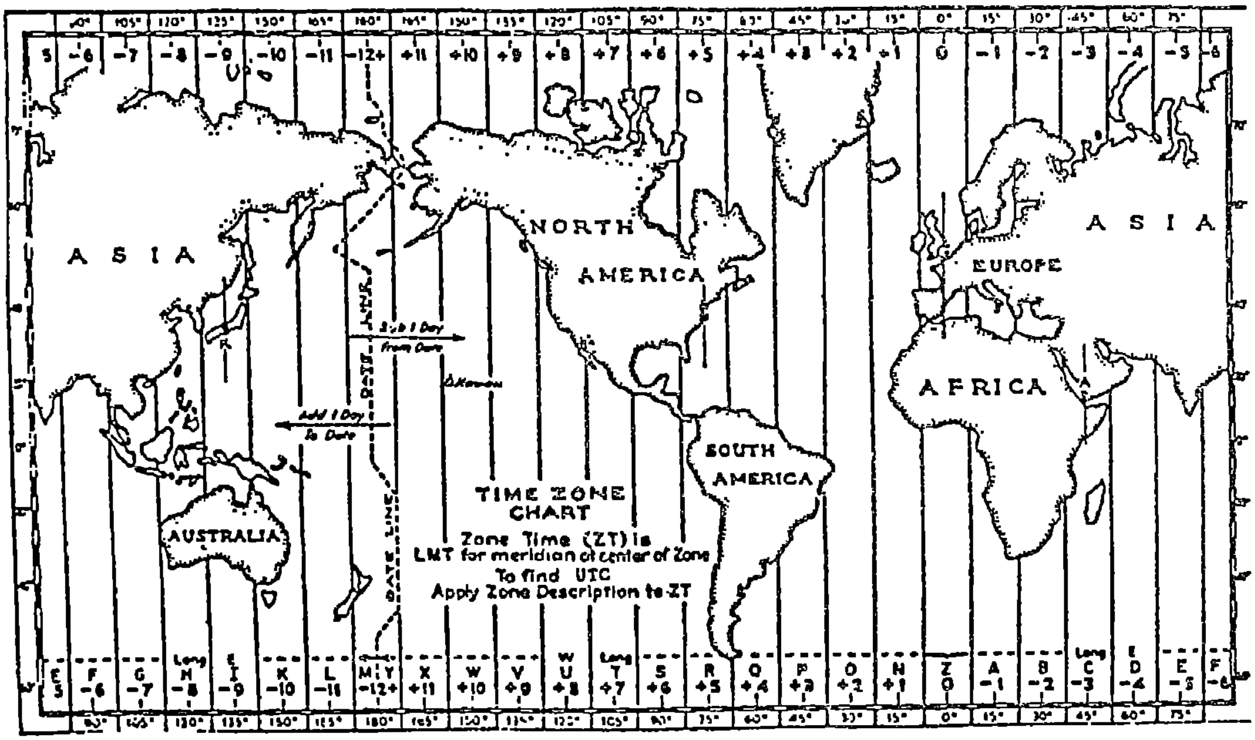


Figure 7.11

Time zone	Designator	correction factor to obtain UTC
UTC	Z	O
EST	R	+5 hrs
EDT	Q	+4 hrs
CST	S	+6 hrs
CDT	R	+5 hrs
MST	T	+7 hrs
MDT	S	+6 hrs
PST	U	+8 hrs
PDT	T	+7 hrs

Table 7.2

If our message were given a priority precedence the preamble would be written P060200Z JUL 90 and would be transmitted "Priority, time zero six zero two zero zero zulu July niner zero"

(c) Address. The address designates the originator and the addresses. Example:

FM: COGARD AUX VESSEL EVER READY (Originator)

TO: COGARD GRU BALTIMORE, MD (Action addressees)
COGARD AIRSTA ELIZABETH CITY, NC

INFO: COGARD AIR STA SAVANNAH, GA (Information addressee)

There must be at least one action addressee. These are the units which you expect to take direct action with regard to the contents of the message. There may or may not be one or more information addressees. These are commands who may become involved or are only administratively interested in the contents of the message. The proword "BREAK" (BT) separates the heading from the text.

6. Text. The text is the body of the message containing the basic information the originator wishes to communicate. The first line of the text starts with the proword "UNCLAS" meaning that the message is unclassified and does not contain any confidential or secret material. This proword is followed by two slant bars then the Standard Subject Identification Code (SSIC) followed by two more slant bars. The SSIC's of interest to Auxiliarists include:

16130 - Search and rescue
16470 - Pollution surveillance & Monitoring
16500 - Aids to navigation
16798 - Auxiliary operations

The next line of the TEXT is the Subject line. This informs the addressee about the general topic of the message. If other messages are to be referenced, they would be listed next. The proper format for listing a referenced message would be to use the designator for the originator of the message followed by the date time group. The precedence of the referenced message is never listed. The referenced messages are lettered. Example:

A. COGARD GRU BALTIMORE 050618Z AUG 90
B. COGARD AIRSTA ELIZABETH CITY 050206Z AUG 90

If more than one paragraph exists in the text the paragraphs are numbered and sub-paragraphs are lettered. Time in the text is expressed in local time (using the 24 hr system) and is followed by the time zone designator as indicated above. When events in the text include a time, the time precedes the action. The end of the text is designated by the proword BREAK written BT. This separates the text from the ending.

7. Ending. The message ends with either the proword OVER. The proword OVER means that the sender expects a reply. When the recipient of the transmission is satisfied that the message has been copied correctly the receiving unit must reply. Example: "This is Coast Guard Auxiliary Happy Daze. I acknowledge your (or COGARD STA VENICE, etc., if the message was relayed rather than transmitted by the originator) priority zero five two three zero zero zulu August niner zero. OUT."

N. <u>Sample Messages</u>

1. Airborne message:

```
0 161802Z OCT 91
FM COGARD AUX ACFT 734UP
TO COGARD GRU MOBILE, AL
   COGARD STA PASCAGOULA, MS
INFO COGARD AIRSTA NEW ORLEANS, LA
BT
UNCLAS //16798//
COASTAL SAFETY PATROL
1.  1300R ABN FROM PENSACOLA FOR SUBJ PATROL.
2.  3 POB.
BT
```

This message from the Auxiliary aircraft advises the call out authority (Group Mobile) that the aircraft was airborne from Pensacola, FL, for a scheduled safety patrol. Station Pascagoula is also made aware of the flight should they have any SAR or other missions in progress with which aircraft support would be useful. Air Station New Orleans is advised of the flight for administrative purposes. This provides the air station with confirmation of the flight for processing of the orders. The number of persons on board is given so that should the aircraft have to make a forced landing, SAR forces would know how many persons must be located.

2. Securing message:

```
P 162219Z OCT 91
FM COGARD AUX ACFT 734UP
TO COGARD GRU MOBILE, AL
   COGARD STA PASCAGOULA, MS
INFO COGARD AIRSTA NEW ORLEANS, LA
BT
UNCLAS //16798//
COASTAL SAFETY PATROL
A.  MY 161802Z OCT 91
1.  1804R LANDED RYAN FIELD, BATON ROUGE, LA.
2.  PATROL SECURED
3.  5.1 HOURS FLOWN
4.  NO DAMAGES
BT
```

NOTE: Airborne messages are sent with an immediate (O) precedence and securing messages are sent with a priority (P) precedence. Since time and space is at a premium in the aircraft cockpit, "canned" or pre-printed message formats are encouraged. These are on hand at the receiving station. The message then can be read rapidly since the receiving station merely has to fill in the blank for the date-time group, airborne or securing time, number of persons on board and number of flight time.

O. SITREPS

Depending on the local operating procedures, Auxiliary aircraft may not be required to originate SITREPS (SAR situation reports), rather they will be asked to provide information to the Coast Guard unit prosecuting the case who will include their participation in the SITREPS from the Coast Guard unit.

P. Position Reports

1. Position reports are required every fifteen minutes for single engine aircraft and every thirty minutes for multi-engine aircraft. This report should include the aircraft position and heading. Example: "Coast Guard Station Pascagoula, this is Coast Guard Auxiliary aircraft seven three four uniform papa. Flight operations normal; position two niner four six North, eight eight five one West; heading two six five degrees. OVER."

2. Aircraft on IFR flight plans, may, but are not required to maintain a radio guard with a Coast Guard or Coast Guard Auxiliary radio facility and are, therefore, not required to make the "OPS NORMAL" reports.

3. Aircraft involved in a search and in a designated search area should maintain communications with the OSC, if one has been designated.

CHAPTER 8 OBSERVER DUTIES

A. Introduction

The purpose of this chapter is to provide radio navigation and communications information for those Auxiliarists qualifying as Auxiliary observers. It is directed towards the use of airborne communications and navigation equipment. Communicators operating Auxiliary fixed land and land mobile stations used for air-to-ground radio guard will find this information useful.

B. Crew Discipline

The pilot in command of an Auxiliary aircraft is responsible for the safe and orderly conduct of the flight. This responsibility and authority exists from the time the pilot begins flight/mission planning until completion of the flight. It is imperative that flight crew members be aware of the authority of the pilot in command and be ready to comply quickly with his/her instructions. The successful completion of the mission or the safety of the crew may be jeopardized if the scope of this authority is not clearly understood.

C. Communications Assistance

1. A typical Auxiliary aircraft on patrol, pollution, or SAR response may have communications with an FAA air traffic control and with regular COast Guard and/or Coast Guard Auxiliary units. These may be Coast Guard cutters, UTB's, aircraft, or ground radio stations on frequencies ranging from high frequency single side band to UHF. A qualified and competent observer can assist the Auxiliary pilot by handling some of these communications directly and by recording pertinent information obtained through these radio contacts.

2. Pilots will prefer to personally handle communications relating to air traffic control since actions required must be correct and immediate. These include communications with airport ground control, clearance delivery, control tower instructions, FAA flight service stations, Air Route Traffic Control Centers, and approach control, which provide separation from other aircraft. Some of these communications will contain information which will be needed later by the pilot. The observer should be ready to record these instructions when requested by the pilot. Observers will soon learn to anticipate which data requires recording.

3. The pilot in command is responsible for all aspects of a flight including the radio transmissions from the aircraft. When in doubt, the observer must obtain approval from the pilot before making a transmission.

D. Communications Equipment

1. Aircraft Band. One or more radio transceivers (VHF-AM) operating in the frequency range of 118.000 to 135.975 MHz are common in aircraft flown by Auxiliarists. They are compact and designed to fit in industry standard racks in the instrument panel. These transceivers are operated in the same manner as radios aboard vessel facilities. There is an off/on-volume control, a squelch control which is used to minimize background noise, and a frequency selector which displays the frequency digitally. If there is more than one aircraft band radio, there will generally be a selector switch which selects which radio is to be used for transmission.

2. Marine Band. Most VHF-FM marine band transceivers used in Auxiliary aircraft are not designed in the standard aircraft stack width for mounting in the instrument panel. These essential radios end up being mounted below the panel or wherever space permits. Often, due to a mismatch of microphone impedances, the marine band radio cannot be interconnected with the aircraft microphone system, thus requiring a separate microphone. A less desirable method to obtain marine band communications is to use a portable unit attached to an external antenna.

3. Commercial band VHF-FM. Where integrated operations with local and state and other federal agencies are common, aircraft may be equipped with a commercial band VHF-FM covering the frequencies from 143.00 to 174.00 MHz. Written authorization must be obtained from the licensee prior to operation on any FCC controlled frequency assigned to any state or local agency. Integrated operations with the Civil Air Patrol are enhanced with communications capability in this frequency range. It should be noted that only Auxiliarists, who are also members of the Civil Air Patrol, may install and operate radios on CAP frequencies. These installations must be authorized in accordance with CAP regulations.

4. Citizen's Band. Some aircraft may be equipped with CB radios, which can be used to communicate with surface vessels in distress. Although citizen's band is not considered reliable for distress communications, it may be the only link available between the distressed vessel and help. The use of these frequencies by Auxiliary aircraft to assist vessels in distress is authorized.

E. Navigation Equipment

1. The observer is not required to learn how to use and operate the navigation equipment discussed in this section although such proficiency can be useful. This section is included to familiarize the observer with the terms and

nomenclature which will be encountered in the cockpit. Familiarity and proficiency will come only after repeated exposure and hands-on training.

2. VOR/DME. Aviation navigation receivers operate in the frequency range of 108.000 MHz to 117.950 MHz to receive signals from ground VHF Omnidirectional range (VOR) stations. These signals provide azimuth information to the aircraft. This information is displayed as the magnetic bearing either to or from the VOR station. The most common term used to describe the azimuth information is the "radial" from the station. This is the magnetic bearing from the station. If the aircraft were on the 140 radial of the Harvey VOR, the magnetic bearing from the HARVEY VOR to the aircraft would be 140 degrees. VORTAC or VOR/DME stations have the additional ability to provide the distance in nautical miles between the aircraft and the station. The equipment used for this function is called DME (distance measuring equipment). The VOR, VORTAC and VOR/DME signals are basically line of sight and are not seriously affected by atmospheric conditions. The computers within the typical navigation receivers will display range and bearing to/from the station and, in the case of a VORTAC or VOR/DME, will also display the range, ground speed and time to the transmitting station.

3. ADF. Another navigation receiver common in Auxiliary aircraft is the automatic direction finder (ADF). This receiver can be tuned to frequencies from 200 to 415 kHz for low frequency radio beacons and from 535 to 1605 kHz to cover the standard AM broadcast band. When tuned to a station, the needle of the indicator will point toward the transmitting station. This may be displayed as either a bearing relative to the heading of the aircraft or as a magnetic bearing from the aircraft to the station.

4. LORAN. The LORAN (long range aid to navigation) receiver/computer will display the aircraft's position in latitude/longitude coordinates. Most LORANs have the capability to store a number of positions as way points and may display range and bearing, ground speed, cross-track error, and other information relative to these way points and the aircraft's position. LORAN does not depend on line of sight signals. Of all of the navigation equipment available in most Auxiliary aircraft, the LORAN is the most useful and is invaluable when conducting search and rescue operations.

5. GPS. Global positioning system depends on information received from a number of satellites. The GPS computer displays the aircraft's position in latitude/longitude and altitude.

F. Use Of Navigation Equipment For Search And Rescue

1. VOR/DME. As stated before, the VOR system is basically line of sight therefore the aircraft's effective range in using this system increases with altitude. The effective range for the VOR portion (azimuth) is greater than that for the DME (range). A position fix may be determined by either a line position (radial) from two VOR stations or one line of position and distance from either a VORTAC or VOR/DME station. This information may be plotted on an aeronautical chart and converted to latitude/longitude, if required. This allows the position to plotted on a nautical chart for use by rescue vessels.

2. ADF. Bearings obtained from an ADF are the least accurate of all of the systems. Their only advantage over the VOR/DME system is that they are not dependent on line of sight. To obtain a bearing using the ADF, set the lubber line of the indicator card to the heading displayed by the magnetic compass or directional gyro. The bearing displayed by the head of the indicating arrow will be the magnetic bearing to the transmitting station and the bearing at the tail of the arrow will be the bearing from the station. Bearing from two or more stations will determine a fix. When plotting these bearings to determine a position you should keep in mind that these are magnetic bearings and variation must be applied before they are used as true bearings on the chart.

3. LORAN/GPS. A position determined by a LORAN or GPS navigation computer is normally displayed in latitude and longitude and may be passed directly to a vessel or shore station with no correction, adjustment, or other processing necessary. As you fly over a significant target, merely enter your position as a way point. Recalling this way point will display the position and the LORAN will provide navigation directions relative to that position. Returning to the position, vectoring a surface craft to the position, or orienting a search about the position becomes simple.

G. Radio Procedure

1. Calls on marine radio frequencies. There are certain procedures and phraseologies that are peculiar to air operations. Air observers should practice these until they become second nature. Practice not only makes perfect but also tends to overcome shyness or "mike fright." Study the following samples of typical radio calls from an aircraft: (your aircraft is N202J)

    a. Call to a Coast Guard station:
    "Coast Guard Station Panama City, this is Coast Guard Auxiliary aircraft two zero two juliet, over."

b. Call to an Auxiliary base station:
"Coast Guard Auxiliary Baton Rouge Radio, this is Coast Guard Auxiliary aircraft two zero two juliet, over."

c. Call to a Coast Guard Auxiliary vessel:
"Coast Guard Auxiliary Battle Ax, this is Coast Guard Auxiliary aircraft two zero two juliet, over."

d. Call to Coast Guard UTB 41490:
"Coast Guard four one four niner zero, this is Coast Guard Auxiliary aircraft two zero two juliet, over."

e. Call to Coast Guard aircraft 6590 participating with you in a SAR mission:
"Coast Guard rescue six five niner zero, this is Coast Guard Auxiliary rescue two zero two Juliet, over."

f. After communications is established, the call before the body of each transmission may be abbreviated to the name of the unit or the at least the last three digits/letters of the call sign:
"Four niner zero, this is zero two juliet, what is your location? Over."
"Battle Ax, this is zero two juliet, Say your ETA on scene. Over."

2. Communication on aeronautical frequencies.

a. When the observer is required to initiate calls on aeronautical frequencies, it is important to note some differences in phraseology and procedure. Although the aircraft call sign remains the same, on initial contact it is helpful to include the make or model of the aircraft before the call sign. This allows the aircraft controller to better identify your aircraft when pointing you out as traffic for other aircraft. When engaged in SAR operations you may use the prefix "Rescue." Examples:

"Miami approach, this is Bonanza two zero two Juliet, over."

"Keesler tower, this is Rescue two zero two Juliet, over."

b. Voice calls for aeronautical stations:

Air Route Traffic Control Centers: "Memphis Center".

Approach control: "Boston Approach"

Airport tower: "Baton Rouge Tower"

Airport ground control: "Langley Ground"

Pre-taxi clearance control: "Kennedy Clearance"

Flight Service Stations: "Portland Radio"

Enroute Flight Advisory Service: "Oakland Flight Watch"

c. Additional procedures to remember:

(1) Time - Use the 24 hour clock and say each digit separately. Example: 0825; "zero eight two five"

(2) When reporting altitudes state separate digits for the thousands, plus hundreds, if appropriate. Example: 4500 ft - "four thousand five hundred"; or, 10,000 ft - "one zero thousand"

(3) When giving a heading or direction use three digits. Example: 050 degrees - "heading zero five zero"; or, due North "heading zero zero zero."

(4) Give speed in knots. Example: 120 knots - "one two zero knots."

(5) When you are "handed off" from one air traffic controller to another, always include your altitude when making the initial contact. Example: "Mobile Approach, this is two zero two Juliet at seven thousand."

(6) Avoid calling Flight Service at 15 minutes past the hour. This is when they are transmitting the regularly scheduled weather broadcasts.

3. Short counts and long counts.

a. Short Count. When a short transmission is required for receiver tuning or direction finding a "short count" is used. This consists of counting from one to five and back. The transmission should not exceed ten seconds.

b. Long Count. When a longer transmission is required a long count is employed. This consists of counting from one to nine and back.

c. Phonetics of a long count:

WUN
TOO
THUH-REE
FO-WER
FI-YIV
SIX
SEVEN

ATE
NINER
NINER
ATE
SEVEN
SIX
FI-YIV
FO-WER
THUH-REE
TOO
WUN

4. In flight reporting.

a. Departure. Immediately after takeoff communications should be established with an Auxiliary or regular Coast Guard station and a flight guard established. At least the following information should be transmitted:

(1) Time of takeoff.

(2) Departure airport.

(3) Number of persons on board.

(4) Mission and/or destination.

Example: "Coast Guard Station Pensacola, this is Coast Guard Auxiliary aircraft two zero two juliet. We were airborne from Navy Pensacola at fourteen hundred sierra (Central Standard Time) with 3 persons on board for a coastal safety Patrol. Request you take our radio guard; primary, channel two three, secondary, five six niner six upper side band. Over."

b. Operations normal. "OPS Normal" reports should be made every 15 minutes for single engine aircraft and at least every 30 minutes for multi-engine aircraft. Times given by aircraft in informal radio traffic are expressed in minutes after the hour with the hour itself not being given unless necessary. This is done because aircraft often cross several time zones is a relatively short period of time. The "OPS Normal" report should include:

(1) Flight status

(2) Position - to the nearest minute of latitude/longitude

(3) Heading

Example: "Coast Guard station Pensacola, this is Coast Guard Auxiliary aircraft two zero two juliet; flight operations normal; position two niner three zero North, eight seven four six West; heading two seven zero degrees. Over."

c. Changing flight guard stations. When changing your flight guard from one station to another, first establish your guard with the new station then secure your guard with the previous station advising them of the identity of the new guard station.

Example: "Coast Guard station Destin, this is Coast Guard Auxiliary aircraft two zero two juliet, I am East bound over the Navarre bridge with three persons on board. Request you take my radio guard. Over."; or,

"Two zero two juliet, this is station Destin. I accept your guard at minute two zero. Primary channel 81; secondary channel 16. Over." (This means that if a radio call is unanswered on the primary channel, it should be tried on the secondary channel.); or,

"Coast Guard station Pensacola, this is Coast Guard Auxiliary aircraft two zero two Juliet. I have established my radio guard with Coast Guard Station Destin., request you secure my guard. Over."

5. Relaying traffic. Because an aircraft presents such an ideal antenna due to the its altitude, you may be the only unit capable of communicating with the vessels or aircraft at the scene of a mission. If you are asked to relay information between the shore station and the units on scene it is imperative that the information be retransmitted exactly as it is received. Under no circumstances inject any subjective interpretation to the information being relayed.

H. Obtaining Aeronautical Weather Information

1. NOAA marine weather. NOAA marine weather, as received on the weather frequencies of most marine radios, is useful in obtaining an overall weather picture. Important information includes sea conditions, the presence of fog, the presence and movement of thunderstorms, and forecast surface winds for the over water areas. This information is neither current nor complete enough to satisfy all of the requirements of aviation. Marine weather does not include ceilings (the lowest layer of broken or overcast layer of clouds) visibilities, or the temperature/dew point spread. The observer should listen to the transcribed NOAA marine weather and pass on to the pilot any significant information which could affect the mission.

2. Aviation weather.

a. Flight Service Stations. Area aviation weather reports are broadcast by FAA Flight Service Stations (FSS) at 15 minutes after each hour on the VOR or VORTAC stations which have voice capability. Typically the information on these reports is not over 15 minutes old. Some Navigation/Communication transceivers have controls which cut out the reception of voice transmissions from the VOR/VORTAC's. Be sure that the controls are set to receive the voice information when listening on navigation frequencies. Flight Service Stations are each assigned the geographical name of their location followed by the word "radio" for their radio call sign. Each Flight Service Station is able to transmit and receive through a number of remote sites. Each of these remote sites has been assigned a discreet frequency which is listed on the aeronautical chart. The FSS can also be called by transmitting on 122.1 MHz and listening on the nearest VOR/VORTAC that has voice capability. When listening on a VOR/VORTAC you should advise the FSS which VOR/VORTAC you are using (e.g. "Deridder Radio, this is two zero two juliet listening on the White Lake VORTAC. Over.").

b. Automated Terminal Information System (ATIS). Many of the more active airports have an automated terminal information system which is continually broadcast on a published frequency for the particular airport. In addition to the current weather, information concerning the active runways, special frequencies, and any hazards that exist or special procedures in use are broadcast. The broadcast is identified by a letter which is changed each time the information is updated.

I. <u>Logs</u>

1. One of the most helpful functions that can be performed by an observer is to record the activities that occur during a mission. This information is necessary for the Coast Guard command to prepare its SITREPS and for the Auxiliarist to log his or her flight time and to complete the reimbursement forms. The time of each occurrence should be recorded followed by the event. Important item to be recorded are:

a. Names of all persons on board.

b. The distance from the takeoff point to the scene of a search when deployed on SAR.

c. Each Take off time. This is recorded as the time when the pilot applies power for the takeoff roll.

d. The time the aircraft arrives on the scene for a search, POLVEST, etc.

e. The time and location of any significant sightings.

f. The weather on scene, including ceiling, wind direction and velocity, visibility, and wave heights and direction of wave movement.

g. The time the aircraft departs the scene of the search and the areas actually searched including the altitudes and track spacing used for each area.

h. Each landing time. This is recorded as the time when the engine is shut down at the ramp.

i. The hours searched to the nearest tenth.

j. The hours flown to the nearest tenth.

k. Number of sorties.

J. Identifying Auxiliary Vessels

Regular Coast Guard vessels are easily identified by their distinctive hull markings or by their blue light. Auxiliary vessels, for the most part, resemble other private vessels. From the air such identifying markings as ensigns, patrol boards names, and numbers provide little help. The advent of the flashing amber and red "public Service Vessel" light will be some help however a more distinctive signal is to have the Auxiliary vessel turn in a tight circle. The circular wake is readily identified from the air. Positive identification of an Auxiliary vessel may be important when providing directions toward a disabled vessel or distress location.

A. Beach Landings

Auxiliary aircraft flight rules authorize operations to 25 miles from shore, therefore it is an accepted risk that search altitudes will result in Auxiliary aircraft operating beyond gliding distance from land. The fact that the aircraft can make it to the beach in itself may not prevent a water ditching since the beach may be crowded with bathers and adequate landing space not available. Beach landing should only be attempted as an emergency measure. Select an area that is clear of debris and land on the area of sand nearest the water to take advantage of the firmness of the wet sand. Use a soft field landing technique. Touch down lightly at minimum airspeed but avoid a stall. Keep the yoke back on touch down whether in tricycle or conventional gear aircraft.

B. Ditching

1. Should it become necessary to ditch in the water, the following actions should be taken:

    a. Broadcast distress information on appropriate frequencies.

    b. Secure or jettison loose gear which could be hazardous on impact.

    c. The inflatable raft must be readily accessible and, if possible, held securely by a crew member.

    d. Wedge the canopy or door(s) in the ajar position to prevent jamming upon impact.

    e. Do not extend the landing gear.

2. Touchdown.

    a. If seas are less than one foot (no white caps) approach into the wind, flaps fully extended. Make a full stall landing with slight power, if available.

    b. If the seas are greater than one foot, approach cross-swell (parallel to the wave crests of the major swell) with flaps fully extended. Approach to take advantage of any head wind component while avoiding landing directly into the face of a swell. As the size of swells increases, the landing heading must increasingly parallel the swell, accepting cross wind components.

    c. If the wind is over 35 knots (gale force), it will be necessary to land into the wind regardless of the swell which will usually be from the same direction as the wind. In this case land on the back side of the swell and into the wind if possible (see figure 9.1).

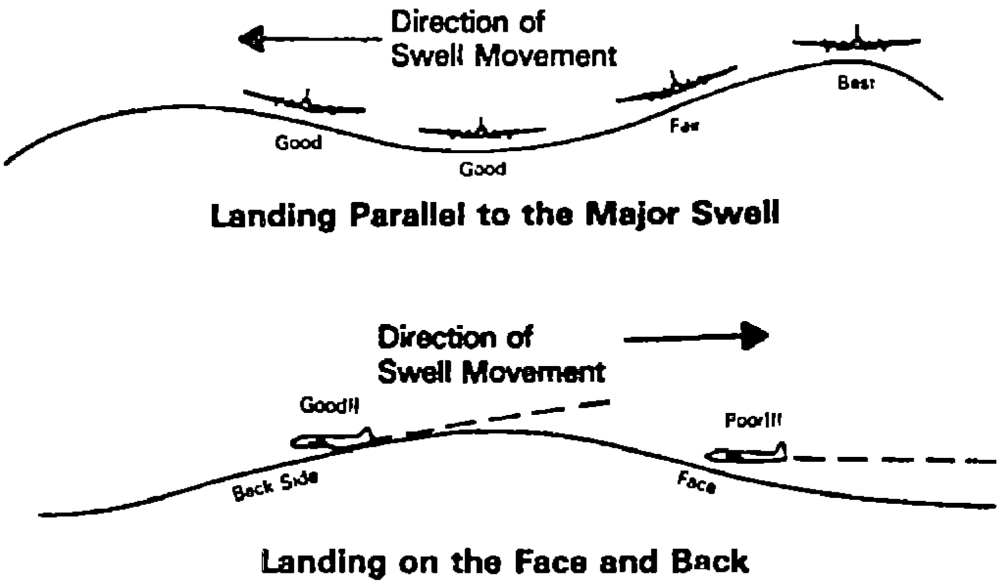


Figure 9.1

3. Exiting The Ditched Aircraft.

   a. With fixed gear aircraft, the likelihood is that the aircraft will invert when it comes to rest in the water. During impact, crew members may become dioriented and not realize that the aircraft is inverted. All crew members should be instructed to assume that the aircraft is in an inverted position, and, when releasing seat belts, be prepared to fall head-down. As soon as practical exit the aircraft, bringing the raft and survival gear with you. All of your personal survival gear should be stowed in your inflatable vest so that it comes out of the aircraft with you.

   b. Plan your egress route in advance. One theme that runs through all Coast Guard mishaps involving underwater egress is that survivors had an escape plan before the accident occurred. No matter where your crew position is located, you should always know where you're going to go in an emergency, how you are going to get there, and what is likely to get in your way.

   c. Maintain your orientation within the aircraft. This is certainly the most important action you can take. Next to panic, disorientation is your biggest problem in accomplishing a successful egress. You should always remember that as long as you remain strapped securely in your seat, your orientation is familiar to you even though the aircraft is upside down in the water. What is normally on your right is still on your right, and what is normally on your left is still on your left. Exit the aircraft promptly with your survival gear.

d. Account for all personnel. The aircraft can be expected to float for as little as 45 seconds.

e. Keep calm. Remember that a person will usually float, not high out of the water perhaps, but he won't sink. He or she will float even higher in the relatively dense salt water of the sea than in a fresh water pool. At first, just paddle slowly with your arms and tread with your legs until you get oriented. If you have a life vest on, and you should, pull the lanyard and inflate the vest. When wearing an inflated life vest, it is easier to swim on your back. If you are also wearing an exposure suit, its natural buoyancy will help keep you afloat until you inflate the vest. Your first thought should be to find your raft and get aboard. Do not remove your shoes or your clothing. Take it easy. Restrict your swimming to reaching your raft. If you have taken the precaution to fasten your raft to your life vest by a lanyard prior to exiting the aircraft, you will not lose it to a stiff breeze.

C. <u>Survival At Sea</u>

1. Life preservers.

a. Pneumatic life preservers are safe, comfortable, and easy to wear and do not require inflation for fitting and adjusting. They are designed to provide sufficient buoyancy to support downed airmen after they bail out or ditch into the water. These preservers are of the rapid inflation style with an auxiliary oral inflation device. Accessory survival items may or may not be attached, depending upon the type of preserver. If not attached, survival items should be carried in the pockets of the flight coveralls. All survival equipment should be attached to you or the raft with a lanyard.

b. It is imperative that all crew members be familiar with the donning, fitting, care, and operation of the preserver that is used in the aircraft. Once aboard a raft, the preserver should be kept inflated in case the raft capsizes or is deflated.

2. Life raft.

a. The raft is inflated by a carbon dioxide cylinder when the lanyard is pulled. There is a valve for oral inflation which closes automatically by spring pressure when it is not held open. Handles or straps are provided as aids for boarding the raft.

b. The best way to board a life raft is to grasp the boarding strap; kick feet vigorously while pulling elbows and life preserver over the raft tube, then grasp the boarding strap on the other side and roll your body into the raft. For the one-man raft, it is better to board over the small end than the side to lessen the possibility of the raft capsizing. Thrust your body over the small end of the raft face down, then roll over to a face up position. Extreme care should be taken by personnel boarding the raft to ensure that no sharp objects puncture the fabric of the life raft. A sea anchor is attached to the raft by a line. Deploy the sea anchor to stabilize the raft and to minimize your drift from the location of the ditching.

c. In the life raft. The life raft normally available to Auxiliary air crews will usually contain little survival equipment and no water or rations. If such survival items are available to a particular crew, they should conduct a dry run and use these items and foodstuffs during the annual training sessions to be ready for the real emergency. It is essential that all of the signalling and survival equipment is attached to either you or the raft. Nothing would be so disheartening as to see your signalling mirror slipping away into the depths of the ocean. Be constantly alert to the danger of puncturing the raft with sharp objects. Do not dangle your hands or feet into the water as this invites unwanted predators (e.g. sharks).

d. If multiple rafts are used, they should be tied together. This creates a larger target which is more likely to be spotted by searching units.

4. Signalling.

The signalling devices that are either carried on the person or in the life raft may be the only equipment that can be used to effect a quick rescue. Know how to use them.

a. Emergency Position Indicating Radio Beacon (EPIRB). EPIRBs transmit a continuous signal on the distress frequencies of 121.5 MHz and/or 243.0 MHz. This signal is received by the SAR satellites and relayed to ground stations. The location of the distress, as determined by the satellite, is passed to the appropriate Rescue Coordination Center which deploys suitable rescue forces. After you are settled in the raft, make sure your EPIRB or other rescue radio (such as a PRC-90) is turned on and remains on until rescue units arrive.

b. Signalling Mirror. Next to the EPIRB, your signalling mirror is the most valuable signalling device you have. Since it does not rely on batteries or pyrotechnics, it is also the most reliable. The military issue mirror has a grid in the center of the rear face. Look through the hole in the center of the rear of the mirror and sight the object on which you would like to direct the sun "flash." Swivel the mirror until you see the grid around the hole light up. This will indicate that the "flash" or solar reflection is directed toward the target. Use your signalling mirror to continually sweep the horizon. A flash from a signalling mirror can be seen in excess of 5 miles. When you are SURE that the rescue unit has you in sight, quit flashing the mirror as its beam is so strong that it will hamper the pilot's ability to fly the aircraft or the coxswain to operate the vessel. Practice using your mirror so if the need should arise you will be proficient.

c. Pyrotechnics. The red flares are for night use and the orange smoke for day. These should not be expended unless search units are within sight and are in a position to be reasonably expected to see them. It would be a wasted resource if ignited when the search unit is moving away from your position. When igniting pyrotechnics, hold them outboard over the downwind side of the raft and pointed downwind so any hot dripping will not damage your raft. When using a pen-gun, it is imperative that the gun be cocked before the flare is screwed onto the end. This retracts the firing pin. If you fail to do this, the flare may ignite as you are screwing it on. The launcher should be pointed overboard and away from any person as it is being loaded. When firing aerial flares aim them downwind with about a 45 to 60 degree elevation. This precludes the possibility of the meteor falling back into the raft or onto you if you are floating in your life vest.

d. Dye Marker. Dye marker creates a large florescent green cloud in the water around you or your raft and greatly enhances sightings from aircraft. The use of dye marker must be planned as it takes approximately three minutes for the dye to fully spread and its effect lasts only 15 to 20 minutes depending on sea conditions. Open the packet then move it back and forth under water next to your raft to disperse the dye.

e. Pocket Strobe. The pocket strobe should be used only at night and when aircraft or vessels are seen or heard as the batteries on the pocket strobe have a limited effective life, typically about 10 hours.

f. Whistle. Over the water the sound of a whistle can be heard for a much greater distance than your voice. Using the whistle requires less effort and can be sustained for a longer period.

g. Space Blanket. The orange side of your space blanket should be spread to enhance the visibility of your target when search units are seen or heard.

5. Exposure. Exposure to sun, wind, and salt water is relatively easy to prevent. Even in the tropics, save all your clothing. Wear clothing most of the time. Don't shed clothing unless you have a paulin to protect you from the rays of the sun.

6. Hypothermia. The rules pertaining to the wearing of Personal Floation Devices (PFD), the carrying of life rafts and the wearing of exposure suits, are found in the AUXILIARY OPERATIONS MANUAL. Recognize the dangers of hypothermia to survivors of a ditching. In cold weather, huddle together under the paulin, wearing dry clothing if possible. Use your space blanket to retain your body heat and to break the cooling effect of the wind. Try to keep the raft dry. Even if you are unable to be in a raft, it is generally a poor idea to attempt to swim. The loss of body heat during swimming is considerably greater than when you remain in the huddle position floating in your PFD. Keep all of your clothing on including your flight boots. Your clothing helps to contain your body heat. Try to keep your head out of the water as it is one of the areas of your body through which considerable heat can be lost.

7. Shark defense. Shark attacks are rare but there are certain things that you can do to minimize the probability of attracting sharks and to defend yourself should they appear. The best situation is to be in a raft. Keep all hands and feet inside the raft. If you are floating in a life vest, make slow even movements. Jerky irregular movements attract sharks. If you fly over waters frequented by sharks, include a very large plastic garbage bag in your survival kit. If you are not in a raft, open the bag and float inside. Scoop water into the bag so that it fills to its expanded shape. A small inflated ring such as a large bicycle inner-tube is ideal to hold the upper rim of the bag. What this accomplishes is to retain your body fluids, which attract sharks, and presents a large object with no projections to the shark. If sharks do appear, attempt to continually face the nearest shark. If the shark attempts an attack, yell or blow your whistle under water. Wearing your gloves or with your hand wrapped strike the shark soundly on its snout from the top. Uppercuts are not recommended as this is where the cutting edge is located. Sharks close their eyes as they attack so as the shark attacks attempt to move slightly to one side.

8. Psychology. A person's worst enemy can be his own mind. You must avoid any tendency to give up even in the face of seemingly overwhelming odds against survival. The shock created by an actual casualty, the immersion in cold and often rough water, and the realization that you are facing a true life-or-death situation increases psychological stress and impairs judgement. Unless you gather not only your resources but your wits and maintain a positive attitude no matter how desperate the situation may seem, your chances of survival will be substantially decreased. The chances of survival of the others with you will be affected by your attitude. You must keep in mind that a maximum effort is being made to rescue you but you must do your part by remaining rational and being ready to signal when the time is right.

9. Recovery by helicopter.

   a. If you are in a raft, it will be necessary to abandon the raft and move away from it. Attempt to fill the raft with water and partially deflate it. Coast Guard helicopter pilots are trained to avoid floating objects, such as life rafts, due to the possibility of blowing the object into the rotor disk. As the helicopter approaches, down wash from the rotor will cause a wall of spray to be generated. Turn you face away from the aircraft until it is overhead. There is a relatively calm area directly under the aircraft. When the basket is lowered, do not touch it until it contacts the water. There is considerable static electricity generated by the helicopter and touching the down bound basket could subject you to a debilitating electrical shock.

   b. Board the basket then signal when you are ready for hoisting with a "thumbs up." Keep your hands and feet inside during hoisting. When you are level with the aircraft wait until the basket is brought aboard before attempting to exit the basket. A sudden movement by you in attempting to assist the hoisting crew could throw everyone off balance and jeopardize the whole evolution.

D. <u>Survival On Land</u>

1. In the case of a forced landing ashore, evacuate the aircraft immediately carrying all of the signalling equipment with you. Stay away from the aircraft until the engines have cooled and spilled gas has evaporated. Check injuries, give first aid, and make any injured comfortable. Be careful in removing anyone from a crashed aircraft as they may have incurred back injuries or fractures. Prepare signals that can be recognized from the air (see illustrations in Chapter 4). Check to insure that your aircraft's ELT has been activated. If it was not activated

by the crash landing, it may be possible to activate it manually. Marshal all your resources including the signalling devices that could be set off when you know that help is near. Keep calm and prepare to wait for help to arrive. It is usually best to stay at the crash site as the crashed aircraft is usually easier to locate than persons on foot. If circumstances are such that you must move away from the crash site, be sure to leave a note with the date and time, and explain your intended route and destination.

2. Hypothermia. Loss of body heat can be minimized by use of layered clothing. After the potential for a post crash fire has passed, the fuselage of the aircraft can be used for protection from the elements. Your "space blanket" can be used as a wind break, as a lean-to or wrapped around you to contain your body heat. It is important to remain as dry as practicable. Wet clothing accelerates heat loss. Use the matches from your waterproof match case to start a fire. Dry kindling can be created by shredding small branches from dead trees or bushes. Even though the outside of the branch may be wet from rain or other precipitation, the interior is usually dry. The fire also provides a signal for search units. Keep a supply of green branches handy. If search units are heard in the area, these can be put on the fire to increase the smoke output. Be careful not to smother the fire in the process.

E. Survival Training

1. All Auxiliary pilots are required to at least annually attend an aviation operations training seminar and all Auxiliary pilots and observers are required to participate in emergency egress and water survival training. This training should be developed on a local level to match the conditions peculiar to the aircraft being flown and to the expected operating environment. Aircrew members should be thoroughly familiar with the equipment they possess for survival. Since the CO2 cartridges should be replaced periodically to insure that they will work when needed, it is not a great expense to actually inflate them for training. Diving into a swimming pool with vest deflated and then inflating the vest after coming to the surface can be done as part of a survival training exercise. All Coast Guard air stations hold wet drills and survival training which are available to Auxiliary air crews by prior arrangement. This is only one example of the training assistance which can be provided to the Auxiliary by Coast Guard air stations. Auxiliary air crews are encouraged to obtain first aid and CPR training. It is the responsibility of the pilot-in-command of each Auxiliary aircraft facility to insure that all crew members are trained in the emergency and egress procedures for the particular aircraft being operated. This requirement is in addition to the general annual training.

CHAPTER 10 FLIGHT SAFETY

A. Alcohol Impairment

Alcohol is a well recognized central nervous system depressant. It is one of the most frequently used (and abused) drugs in our society. Even small amounts of alcohol in the blood can impair judgement, reflexes, and muscular control. The level of alcohol in the body varies with the frequency and amount of alcohol intake, the length of time following cessation of drinking, and an individual's body weight. A zero alcohol level is essential for aviation personnel to meet the rigorous demands of flight operations. Detactable blood alcohol or symptomatic hangover are causes for grounding of flight crew personnel. Moreover, flight operations (beginning with flight planning) are prohibited within 8 hours of consumption of 1 or 2 drinks (1 drink is defined as any of the following: 12 oz. of beer, 4 oz. of wine or 1 oz. of spirits) and within 12 hours of consumption of 3 or more drinks. Although some personnel may completely metabolize all alcohol well within the 8 or 12 hour limit, this time span allows an adequate margin of safety before resuming flight operations.

B. Flight Restrictions Following Blood Donation

Aircrew personnel should not fly on ordered flights for 5 days following donation of 500 cc of blood or until cleared by a medical examiner, if the proposed flight is scheduled within the minimum five day period.

C. NASA Aviation Safety Reporting System

1. Purpose. This cooperative safety reporting program invites pilots and other users of the National Aviation System to report to the National Aeronautics and Space Administration (NASA) actual or potential discrepancies and deficiencies involving the safety operations. The effectiveness of this program in improving safety depends on the free, unrestricted flow of information from the users of the National Aviation System. Based on information from the program, the Federal Aviation Administration (FAA) will take corrective action as necessary to remedy defects or deficiencies in the National Aviation System. The reports may also provide data for improving the current system and planning for the future.

2. NASA Responsibilities.

    a. The NASA Aviation Safety Reporting System (ASRS) provides for the receipt, analysis, and de-identification of aviation safety reports; in addition, periodic reports of findings obtained through the reporting program are published and distributed to the public, the aviation community, and the FAA.

b. A NASA ASRS advisory committee conducts periodic meetings to evaluate and ensure the effectiveness of the reporting system.

3. Prohibition against use of reports for enforcement purposes.

a. Section 91.57 of the Federal Aviation Regulations (14CFR 91.57) prohibits the use of any report submitted to NASA under the ASRS (or information derived therefrom) in any disciplinary action, except information concerning criminal offenses or accidents.

b. When a violation of the Federal Aviation Regulations comes to the attention of the FAA from a source other than a field report filed with NASA under ASRS, appropriate action will be taken.

c. The NASA ASRS security system is designed and operated by NASA to ensure the confidentiality and anonymity of the reporter and all other parties in a reported occurrence or incident. The FAA will not seek, and NASA will not release or make available to the FAA, any report filed with NASA under ASRS or any other information that might reveal the identity of any party involved in an occurrence or incident reported under ASRS.

4. Reporting procedures. NASA ARC Form 277, which is preaddressed and postage free, is available at FAA offices. This form or a narrative report should be completed and mailed to: Aviation Safety Reporting System, P. O. Box 189, Moffett Field, CA 94035.

5. Enforcement policy:

a. It is the policy of the Administrator of the FAA to perform his responsibility under the Federal Aviation Act for the enforcement of the Act and the Federal Aviation Regulations in a manner that will best tend to reduce or eliminate the possibility of, or recurrence of, aircraft accidents. The FAA enforcement procedures are set forth in Part 13 of the Federal Aviation Regulations (14CFR Part 13) and FAA enforcement handbooks.

b. In determining the type and extent of enforcement action to be taken in a particular case, the following factors are considered:

(1) Nature of the violation;

(2) Whether the violation was inadvertent or deliberate;

(3) The certificate holder's level of experience and responsibility;

(4) Attitude of the violator;

(5) The hazard of safety of others which should have been foreseen;

(6) Action taken by employer or other Government authority;

(7) Length of time which has elapsed since violation;

(8) The certificate holder's use of the certificate;

(9) The need for special deterrent action in a particular regulatory area, or segment of the aviation community; and

(10) Presence of any factors involving national interest, such as the use of aircraft for criminal purposes.

c. The filing of a report with NASA concerning an incident or occurrence involving a violation of the Act or the Federal Aviation Regulations is considered by the FAA to be indicative of a constructive attitude. Such an attitude will tend to prevent future violations. Accordingly, although a finding of a violation may be made, neither a civil penalty nor certificate suspension will be imposed if:

(1) The violation was inadvertent and not deliberate;

(2) The violation did not involve a criminal offense, or accident, or action under section 609 of the Act which discloses a lack of qualification or competency, which are wholly excluded from this policy;

(3) The person has not been found in any prior FAA enforcement action to have committed a violation of the Federal Aviation Act, or any regulation promulgated under that Act for a period of 5 years prior to the date of the occurrence; and

(4) The person proves that, within 10 days after the violation, he or she completed and delivered or mailed a written report of the incident or occurrence to NASA under ASRS.

6. Availability of forms. Copies of the reporting form (NASA ARC Form 277) may be obtained free of charge from FAA offices, including flight service stations or directly from NASA at the ASRS office, P. O. Box 189, Moffett Field, CA 94035.

CHAPTER 11 MILITARY ETIQUETTE

A. Uniforms/Flight Suits

As described in the AUXILIARY OPERATIONS POLICY MANUAL, the selection of appropriate flight clothing is the prerogative of the pilot in command and should be the same for all of the flight crew members. For other than VIP transport, Coast Guard issue olive drab or blue NOMEX flight suits and gloves are preferred as they provide a degree of protection in the event of a post crash fire.

B. VIP Transport

1. When members of the flight crew are expected to accompany VIP passengers to functions at the destination of a flight, it is preferred that they wear the same uniform as the VIP passenger during the flight.

2. Always arrive at the pickup point for the VIP passenger prior to the pickup time. Preflight the aircraft and have it ready for departure when the VIP arrives. Be standing at the aircraft when the VIP arrives and return a salute if one is rendered. When practicable, the ranking officer should be the last to enter the aircraft and the first to disembark.

3. Arrival at the destination should be as close to the scheduled arrival time as possible, but not earlier, without notifying the reception personnel well in advance. In most situations, the reception personnel will have radio communication capabilities. Keep them informed of your progress. Know before departure exactly which facility or FBO at the destination airfield will be the disembarkation point. Study the airfield diagram so you can taxi smoothly after landing. When feasible stop the aircraft with the door which the VIP will disembark toward the reception personnel. Do not disembark personnel with the engine(s) running.

4. Plan to have refreshments on board. Do a little investigative work to determine the preferences of your VIP passenger. Have charts ready to show your passenger your progress and point out areas of interest. Always make maneuvers as smooth as possible. Make standard rate turns. Avoid steep banking turns and abrupt transitions to descent. What may be normal for an aviator may terrify your passenger. Make your descents and approaches gradual. To avoid an attempt by air traffic controller (ATC) to bring you to the airfield high, advise them early that you will require a gradual descent. Touch down as lightly as you can with a long roll-out.

5. A work sheet such as the one in figure 11.1 should be prepared and distributed to all parties involved in the VIP transport evolution so that all concerned know exactly where and when the aircraft will depart and arrive for each leg of the flight (see figure 11.2 for an example).

UNITED STATES COAST GUARD AUXILIARY

WORK SHEET FOR VIP FLIGHTS

Date of mission: Date prepared:

Aircraft assigned:

Pilot:

VIP Passenger:

Number of other passengers:

Point of embarkation- City:
Airport:
FBO:

Planned time of departure:

Transport to- City:
Airport:
FBO:
Coast Guard freq. at destination:
Coast Guard call sign at destination:
Coast Guard contact at destination:

Estimated time of arrival:

Estimated time of departure for return:

Point of return:

Estimated time of return:

Distance to destination: NM, Estimated time enroute:

Planned route of flight:

Person to contact to coordinate mission:

Telephone #:

Appropriate uniform(s):

Figure 11.1

EXAMPLE:

EIGHTH COAST GUARD DISTRICT AUXILIARY

WORK SHEET FOR VIP FLIGHTS

Date of mission: Sat. 17 Aug 1991   Date prepared: 12 Aug 1991

Aircraft assigned: 4052H (Mooney 201)

Pilot: Joachim Wedekind H: 834-0815; Cellular: 583-3861;
FAX: 831-1761; Hangar: 242-7652

VIP Passenger: RADM JAMES LOY

Number of other passengers: 1 (Kay Loy)

Point of embarkation- City: New Orleans
Airport: Lakefront (NEW)
FBO: Main Terminal

Planned time of departure: 1530S

Transport to- City: Destin, FL
Airport: Destin-Ft. Walton Beach (81J)
FBO: Miracle Strip Aviation (EXXON)
(904)837-6135
Coast Guard freq. at destination: Chan. 81A
Coast Guard call sign at destination: Coast Guard Station Destin
Coast Guard contact at destination: COMO Mike Quirk
at Holiday Inn, (904)243-9181

Estimated time of arrival: 1700S

Estimated time of departure for return: Sun. 03 Feb, 1000S

Point of return: New Orleans Lakefront Airport

Estimated time of return: 1130S

Distance to destination: 199 NM, Estimated time enroute: 1+30

Planned route of flight: MSY V20 GPT BFM NUN 81J

Person to contact to coordinate mission: LT Steve Doyle

Telephone #: (504)589-6298, H: 866-2311, FAX: 589-3967

Appropriate uniform(s): Service Dress Blue or blue flight suit

Figure 11.2

C. Transiting Military Airfields

1. A prerequisite for a no-hassle arrival at a military field is proper notification and coordination. Use the IFR supplement to determine which fields require a Prior Permission Required (PPR) number. It is preferable that your call out authority contact their base operations and coordinate your visit even when a PPR number is not required. Even with a PPR number, you should file a flight plan into a military field. In the remarks section, request that flight service notify the destination airfield of your arrival. **You will be required to file a flight plan with their base operations before departing.** Be familiar with the DD-175 military flight plan which is what you will be expected to file. Before filing the flight plan you will need a signed weather brief for the forecaster at the field.

2. If you are to transport an 0-6 (Captain) or higher, you must advise the field. An unannounced arrival with a 0-6 or higher is a serious breach of etiquette. Have your call out authority contact base operations at the destination via landline approximately one hour before you arrival to remind them that you have a VIP on board. On initial contact with the destination tower advise that you have a VIP passenger. Example: "Navy Pensacola tower, this is 734UP with one code 7 aboard inbound for landing." The code numbers to use are listed in this chapter in section D.

3. Most military fields no longer have AVGAS available. Even when they do, we do not normally carry the government credit cards required. Your flight will go smoother if you plan to fuel elsewhere.

4. Most military towers guard 126.2 MHz in addition to their UHF and/or VHF working frequencies. Use the IFR supplement to confirm tower and ground frequencies. Normal JEPPESEN approach plates do not include the military fields. If you expect to arrive on an IFR flight plan, you should have your call out authority obtain for you the necessary DOD approach plates.

5. On landing you will be expected to taxi to the base operations for disembarking your passengers then to a transient parking area if you expect to remain for an extended period. Again pre-planning will make the evolution occur smoothly. You can expect to be directed by a "follow me" truck and positioned by a taxi director. Always chock your aircraft before leaving it.

6. Unlike civilian fields, you may not wear ball caps or other hats on the flight line. The only exception to this is a flight helmet.

D. <u>Military Flight Plans (DD-175)</u>

The following is a series of excerpts from the DOD FLIGHT INFORMATION PUBLICATION (FLIP) titled GENERAL PLANNING. This publication should be used if more information is required. Only the information normally applicable to Auxiliary aircraft has been reproduced. Refer to figure 11.3 to identify the following:

1. DATE. Enter date of the flight in local time.

2. AIRCRAFT CALL SIGN. Use the letter C instead of N, which designates Coast Guard, followed by the rest of your aircraft number. e.g. C1365B or C734UP.

3. AIRCRAFT DESIGNATION AND TD CODES.

    a. Aircraft designation. Enter the aircraft designation in the same manner that you would on a civilian flight plan.

    b. TD codes. These are the same as for civilian aircraft:

        A = Transponder with mode C & DME
        B = Transponder with no mode C & DME
        C = Transponder with no mode C & RNAV
        R = Transponder with mode C and RNAV
        T = Transponder only with no mode C
        U = Transponder only with mode C

4. TYPE FLIGHT PLAN. Enter I for IFR or V for VFR as appropriate for that segment. Do not combine IFR and VFR route segments on the same line. Enter D for VFR flights conducted in accordance with ADIZ procedures (DVFR).

5. TRUE AIR SPEED. Enter the TAS to be maintained at the initial cruising altitude.

6. POINT OF DEPARTURE. Enter the location identifier of the departure airport or the point (NAVAID of fix) where IFR will begin.

7. PROPOSED DEPARTURE TIME (Z). Enter the proposed departure time in Coordinated Universal Time (UTC); allow sufficient time for Base Operations to process the flight plan.

8. ALTITUDE. For IFR or VFR enter the initial cruising altitude in hundreds of feet. (e.g. enter 6000 feet as 60; 7500 feet as 75; 15,000 feet as 150)

9. ROUTE OF FLIGHT.

   a. For composite flight plans do not combine IFR and VFR route segments on the same line.

   b. Clearly define the route of flight by using NAVID identifiers, airways, named intersections and RNAV waypoints. The absence of an airway identifier between fixes/NAVAIDS indicates direct flight.

   c. For VFR flight plans, the last fix entered is the point from which the final leg is begun to the destination.

   d. For IFR flight plans, the last fix entered is the identifier of the nearest appropriate IAF, NAVAID, first point of intended landing, or published fix which most clearly establishes the route of flight to the destination.

   e. For a composite flight plan, the last entry in the ROUTE OF FLIGHT is the fix/facility at which the transition is made. Comply with paragraph D.9.c. above, if the final leg to the destination is VFR, and comply with paragraph D.9.d. above, if the final leg to the destination is IFR.

   f. Stopover flight plans.

      (1) Each leg after the initial leg is entered as described in paragraph 4 through 11.

      (2) In parenthesis following the last entry of successive legs, enter the hours of fuel on board (e.g. 3 + 30).

      (3) If an alternate is required, enter the airfield identifier and the ETE to the alternate in the parenthesis with the fuel in board entry (e.g. 3 + 30 SKF 0 + 30).

10. TO. Enter location identifier of the final destination opposite the last line entry in the ROUTE OF FLIGHT. If there is no location identifier enter the airport name.

11. ESTIMATED TIME ENROUTE.

   a. VFR Flight Plan. The time from takeoff to a point over the destination airfield, including known or pre-planned enroute delays.

   b. IFR Flight Plan. The time from takeoff to the last fix shown in the ROUTE OF FLIGHT exclusive of planned enroute delays.

c. Composite Flight Plan. For each IFR segment, use the time planned to fly the segment exclusive of enroute delays; for each VFR segment, use the time planned to fly the segment including known delays.

12. REMARKS. Enter information essential to safe and efficient control of air traffic. Service codes and other pertinent information should be included in this section.

a. Service Codes:

PPR (number)- PPR number if applicable.

S- Service required.

R- Aircraft will remain over night.

b. Enter in plain language information deemed necessary to be transmitted to the destination airfield.

c. VOID Time- Required for all stopover flight plans. Calculate the VOID time by taking the total time from takeoff to final destination, rounded to the next whole hour. e.g. for total time 4 + 20 enter "VOID 5 + 00.

13. RANK/HONOR CODES. Enter the letter designator for the service followed by the VIP codes followed by the honor code letter.

a. Designator letter - Service category

Designator letter	Service category
A	Air Force
C	Coast Guard
M	Marine Corps
R	Army
V	Navy

b. Code numbers for VIP's.

1- President of the United States (not normally flown by Auxiliary)

2- Vice President of the United States
Admirals of the fleet (5 stars)
Generals of the Army (5 stars)

3- Commandant of the Coast Guard
Generals (4 star)
Admirals (4 stars)

4- Vice Commandant of the Coast Guard
Coast Guard Area Commanders
Vice Admirals (3 stars)
Lieutenant Generals

5- Rear Admirals (2 stars)
   Major Generals

6- Rear Admirals (lower half) (1 star)
   Major Generals

7- Coast Guard and Navy Captains
   Colonels, Army, Air Force & Marines

c. Honor Code Letters.

H- Accord honors as appropriate.

N- Accord no honors; request informal visit with the commander.

O- Request nothing.

(e.g. C5H means VIP, Coast Guard Rear Admiral, accord honors; and
C70 means VIP, Coast Guard Captain, request nothing.)

14. FUEL ON BOARD. Enter the total time that an aircraft can stay aloft while flying the planned profile with the fuel available at initial takeoff.

15. ALTERNATE AIRFIELD. Enter alternate airfield selected under FAA criteria. If IFR on a stopover flight plan, the alternate listed is for the first point of intended landing. Alternates required for subsequent stops will be included in the ROUTE OF FLIGHT section of the flight plan. Use the three letter location identifier to identify the alternate airport.

16. ETE TO ALTERNATE. Enter the time required to fly from the original destination to the alternate airport, based on flight at the last cruising altitude.

17. & 18. NOTAMS/WEATHER. Included as a preflight reminder and may be used as directed locally. A check mark indicates that you have checked the NOTAMS and the weather briefer will initial the WEATHER block after your briefing.

19. WEIGHT AND BALANCE. This block is not applicable to Auxiliary aircraft.

20. AIRCRAFT SERIAL NUMBER/UNIT/HOME STATION.

a. Enter the aircraft tail number (less the "N")

b. Enter the aircraft unit of assignment; your call out authority. e.g. CGAS NOLA, COGARDGRU MIAMI

c. Enter the three letter location identifier of your home airfield.

d. e.g. 202J/COGARDGRU MOBILE/MOB (Aircraft 202J from Coast Guard Group Mobile, Al. located at Bates Field, Mobile, Al.)

21. SIGNATURE OF APPROVAL AUTHORITY. To be signed by the pilot in command.

22. CREW/PASSENGER LIST. Check "attached".

23. ACTUAL DEPARTURE TIME (Z). For base operations use.

24. DUTY. Enter the symbol for the duty to be performed by each person listed.

    CP - Co-Pilot
    OB - Observer
    PX - Passenger

25. NAME AND INITIALS. Enter as appropriate.

26. RANK. Enter the appropriate rank designator.

27. SSN. Enter individual social security numbers.

PRIVACY ACT STATEMENT	DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
AUTHORITY: 10 USC 8012 and EO 9397. PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the flight. ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan. DISCLOSURE: Voluntary. However, failure to provide the SSN could result in denial of flight plan processing.	(1) Ø1 AUG 91	(2) C 1365 B	(3) C18Ø/A
BASE OPERATIONS USE			

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	I	12Ø	NBG	14ØØ	9Ø	HRV V198 BFM NUN	NPA	1+1Ø

REMARKS (12)

RANK AND HONOR CODE (13) C 7 D

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
(14) 6+3Ø	(15) MOB	(16) Ø+3Ø	(17) ✓	(18) KTM	(19) ✓	(20) 1365 B / CGAS NOLA / NBG

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST (22)	ACTUAL DEP TIME	BASE OPERATIONS USE
(21) R B McConnell	✓ ATTACHED / SEE PSGR MANIFEST	(23)	

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND (24)	(25) McConnell, R.B.	(26)	(27) 437-65-842Ø	(28) USCG AUX / NBG
PX	Smith, J. A.	CAPT	421-95-7885	COGARGRU NOLA / NEW Orleans

IFR Point to Point
Figure 11.3

CHAPTER 12 FILING FAA FLIGHT PLANS

A. Filing

1. Observer. Pilots of all categories are required to be proficient in filing Federal Aviation Administration (FAA) flight plans. The Observer, however, may need some guidance when requested by the pilot to prepare and/or file a flight plan (see figure 12.1).

2. Where to file. Flight plans are normally filed with the FAA Flight Service Station (FSS) with jurisdiction for the departure airport. To contact the FSS call 1-800-WX-BRIEF (1-800-992-7433). The flight plan may be given to a flight service specialist or left on the "Fast File" if the FSS is equipped with an automated telephone system. This applies to both VFR and IFR flight plans.

3. When to file. Flight plans may be filed up to 24 hours prior to departure.

4. What happens to the flight plan.

    a. VFR. When the aircraft departs from the initial airport and notifies the FSS, the flight plan is activated or "opened." After a VFR flight plan is activated, it is forwarded to the FSS covering the destination airport. If the aircraft arrives safely at the planned destination within the time period listed on the flight plan and notifies the cognizant FSS, the flight plan is closed. Should the aircraft not arrive within 30 minutes after the stated arrival time, the FSS will commence attempts to locate the aircraft. The FSS will telephone the destination and alternate airports to see if the aircraft arrived but the pilot failed to close the flight plan. The FSS will also attempt to contact the aircraft via radio through the Air Traffic Control (ATC) facilities along the listed route of flight. If this is unsuccessful, a full fledged search will be initiated. This is why it is most important to close a flight plan at the end of a flight. The tower at a **military field** will normally close a VFR flight plan without being requested.

    b. IFR. Instrument flight plans are normally activated when the aircraft is released into the IFR system by the cognizant ATC facility (control tower, approach control, etc.). The aircraft is tracked either by radioed position reports and/or by RADAR. The Flight plan is normally closed by the control tower at the destination airport, when the pilot cancels the IFR clearance in flight or by telephone on arrival at an unattended airport.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FLIGHT PLAN

1. TYPE	VFR / IFR / DVFR	
2. AIRCRAFT IDENTIFICATION		
3. AIRCRAFT TYPE/SPECIAL EQUIPMENT		
4. TRUE AIRSPEED		KTS
5. DEPARTURE POINT		
6. DEPARTURE TIME	PROPOSED (Z)	ACTUAL (Z)
7. CRUISING ALTITUDE		
8. ROUTE OF FLIGHT		
9. DESTINATION (Name of airport and city)		
10. EST. TIME ENROUTE	HOURS	MINUTES
11. REMARKS		
12. FUEL ON BOARD	HOURS	MINUTES
13. ALTERNATE AIRPORT(S)		
14. PILOT'S NAME ADDRESS & TELEPHONE NUMBER & AIRCRAFT HOME BASE		
15. NUMBER ABOARD		
17. DESTINATION CONTACT/TELEPHONE (OPTIONAL)		
16. COLOR OF AIRCRAFT		

FAA Form 7233-1

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FLIGHT PLAN

1. TYPE	X VFR / IFR / DVFR	
2. AIRCRAFT IDENTIFICATION	C1365B	
3. AIRCRAFT TYPE/SPECIAL EQUIPMENT	C180/A	
4. TRUE AIRSPEED	120	KTS
5. DEPARTURE POINT	NBG	
6. DEPARTURE TIME	PROPOSED (Z): 2100Z	ACTUAL (Z):
7. CRUISING ALTITUDE	1000	
8. ROUTE OF FLIGHT	HRV PEARL V198 DOGMA 30-00.0/88-50.0 29-30.0/89-10.0 HRV	
9. DESTINATION (Name of airport and city)	NBG	
10. EST. TIME ENROUTE	HOURS: 2	MINUTES: 30
11. REMARKS		
12. FUEL ON BOARD	HOURS: 6	MINUTES: 30
13. ALTERNATE AIRPORT(S)	NEW	
14. PILOT'S NAME ADDRESS & TELEPHONE NUMBER & AIRCRAFT HOME BASE	R.O.POWELL, ON FILE CGAS NEW ORLEANS, LA (504-393-6033)	
15. NUMBER ABOARD	3	
17. DESTINATION CONTACT/TELEPHONE (OPTIONAL)	504-393-6033	
16. COLOR OF AIRCRAFT	WHITE/ORANGE	

FAA Form 7233-1

Figure 12.1

5. Airman's Information Manual (AIM). The primary source for detailed information about completing the FAA Flight Plan form is in the AIM. What is presented here is the basic information to complete the form for a typical Auxiliary operational flight.

B. <u>Completing FAA Flight Plan Form 7233-1</u>

1. Mark IFR or VFR as appropriate.

2. List the aircraft FAA registration number preceded by a "C" instead of an "N". This designates that the aircraft is a Coast Guard aircraft. An Auxiliary aircraft operating under official Coast Guard orders is a Coast Guard aircraft (e.g. C734UP or C1365B). When this block is read over the telephone to the FSS it would be "Coast Guard seven three four uniform papa." The letter "C" is not read. The FSS will insert the "C."

3. List the aircraft by the manufacturer's designation (e.g. Cessna Skywagon = C-180; Piper Cherokee = PA-28; Beechcraft Bonanza = BE-35). This designator is followed by a slant bar and a letter designating the electronic navigation equipment on board the aircraft. These are:

   (a) /X - no transponder.

   (b) /T - transponder with no altitude encoding capability.

   (c) /U - transponder with altitude encoding capability.

   (d) /D - DME but no transponder.

   (e) /B - DME and transponder but no altitude encoding capability.

   (f) /A - DME and transponder with altitude encoding capability.

   (g) /C - RNAV (Area Navigation System) and transponder, but with no altitude encoding capability.

   (h) /R - RNAV and transponder with altitude encoding capability.

   (i) /W - RNAV but no transponder.

   (e.g. Cessna Skywagon with DME and transponder with altitude encoding capability = C-180/A)

4. List the aircraft's computed true air speed (TAS).

5. Enter the departure airport identifier code. This can be found in the VFR - SUPPLEMENT or the IFR - SUPPLEMENT published by DOD.

6. Enter the proposed departure in Coordinated Universal Time (UTC)(Z).

7. Enter the requested enroute altitude or flight level.

8. Define the route of flight using NAVAID identifier codes and airways. Waypoints may also be identified using latitude/longitude. The beginning and/or ending NAVAID is usually the one used to support instrument approaches to the departure or destination airport. These NAVAIDS are not necessarily on the airport itself.

9. Enter the destination airport identifier code.

10. Enter the estimated time enroute in hour and minutes based on forecast weather.

11. Enter only those remarks pertinent to ATC or to the clarification of other flight plan information.

12. Specify the fuel endurance from the departure point in hours and minutes.

13. Specify an alternate airport if appropriate.

14. Enter the complete name and address and telephone number of the pilot-in-command. Enter sufficient information to identify the home base, airport, or operator. If the information is on file this can be entered: LTJG O. Rush, on file Coast Guard Air Station New Orleans, LA, (504) 393-6033.

15. Enter the total number of persons on board including the flight crew.

16. Enter the predominate colors.

17. Record a destination telephone number to assist search and rescue should you fail to report or cancel your flight plan within 1/2 hour after your estimated time of arrival.

C. <u>Preplanned Or "CANNED" Flight Plans</u>

If the same patrol route is used frequently, a flight plan with all of the information concerning the flight except the departure time can be pre-filed with the FSS. This flight plan is called up and activated for each patrol. Contact the cognizant FSS for the procedure to create a canned flight plan.

CHAPTER 13 CONDUCTING THE SAR PROCEDURES CHECK

A. Background

Figures 13.1 thru 13.3 contain the complete form used for conducting the SAR PROCEDURES CHECK required by the AUXILIARY OPERATIONS POLICY MANUAL. The form is self explanatory.

Department of Transportation
U. S. Coast Guard
ANSC #7048 (4-93)

<u>AUXILIARY AVIATION SAR PROCEDURES CHECK</u>

Name of Pilot__________________________, AUX. #___________________

Section I, Knowledge:

A. SAR PATTERNS. Ask the pilot being checked to describe the following patterns and when each should be used: Track Line (TSR), Parallel track (PS), Creeping Line (CS), Expanding Square (SS), Sector (VS).

Initials_______, Date____________

B. SURFACE/AIR SIGNALS. Have the pilot demonstrate the body signals for AFFIRMATIVE, NEGATIVE, ALL O.K. DO NOT WAIT, OUR RECEIVER IS OPERATING, USE DROP MESSAGE, NEED MECHANICAL HELP and NEED MEDICAL HELP.

Initials_______, Date____________

C. PREFLIGHT. Evaluate the pilot's method and thoroughness in obtaining weather information, laying out a search based on the information you provide for a simulated distress, fuel planning and the preparation and filing of the flight plan. The pilot should note any hazards in the enroute or search area such as towers, high terrain or power lines. The pilot should explain exactly what he or she expects you to do as a member of the flight crew. Discuss altitude and airspeed minimums as applies to the mission being flown. This should include a discussion of altitude separation and airspace restrictions when involved in a multi-aircraft search. Discuss the authority of the On-scene Commander and the importance of maintaining communications with him or her and complying with all instructions given. Discuss the communications schedule with the flight following unit and procedures to be followed in the event communications are lost.

Initials_______, Date____________

D. EMERGENCY PROCEDURES. Evaluate how thoroughly the pilot explains to you the emergency and egress procedures for the aircraft to be used for the check and use of the flotation and survival equipment on board. This should include an inspection of the required survival equipment to insure that it meets the minimum requirements and has been inspected or repacked in accordance with the manufacturer's instructions.

Initials_______, Date____________

Figure 13.1

Page 2.

Section II, Practical:

1. WIND DIRECTION/VELOCITY. Estimate the surface wind velocity and direction by observing the wave action.
   Initials_______, Date____________

2. SEARCH PATTERN TECHNIQUE. Evaluate the pilot's ability to fly several legs of a search pattern. This may be done by Dead Reckoning or using LORAN or GPS. Assign a new pattern in flight and evaluate the pilot's ability to locate the datum and navigate a leg or two. Evaluate the pilot's ability to navigate and to maintain heading and altitude while searching. Note whether a lookout is maintained for other traffic.
   Initials_______, Date____________

3. ORBITING A TARGET. Have the pilot complete two turns around a vessel or other target on the surface. Evaluate his or her ability to maintain altitude, distance from the target and, 13 1 most importantly 13 , maintain coordinated flight.
   Initials_______, Date____________

4. COMMUNICATIONS. Evaluate the pilot's procedure in communicating with ATC facilities and with Coast Guard units.
   Initials_______, Date____________

5. NAVIGATION. Evaluate the pilot's ability to navigate using surface features described on Sectional and marine charts.
   Initials_______, Date____________

6. VESSEL IDENTIFICATION. Have the pilot identify the types of vessels indigenous to the area of operation (Types of tugs barges, ships, pleasure craft, commercial vessels etc.).
   Initials_______, Date____________

7. EMERGENCY PROCEDURES. Have the pilot simulate an emergency and evaluate his reaction (His ability to locate a suitable landing area, perform the emergency procedures in accordance with the AFM, transmit a distress message, etc.).
   Initials_______, Date____________

Section III, Post Flight:

1. Discuss the flight and make suggestions, if appropriate, on how to improve the pilot's performance.

2. Discuss the importance of how the pilot, crew and aircraft look. Remind him or her that they represent the Coast Guard when on ordered missions. The aircraft should be clean and the aircrew should be in clean flight suits or uniforms.

Figure 13.2

Page 3.

Section IV, General Notes:

1. If in your evaluation the pilot does not meet the criteria in any area, he or she should seek additional training and be re-tested in that area only.

2. One of the most important aspects of this check is your evaluation of the pilot's judgement. Bottom line - is he or she a **safe, prudent and professional** pilot.

3. This sheet may be given to the pilot to be tested in advance of the flight so that the pilot will know exactly what is expected.

4. Note and sign in the pilot's log book the successful completion of this SAR PROCEDURES CHECK.

SAR PROCEDURES CHECK SUCCESSFULLY COMPLETED.

Name of pilot performing final check_____________________________,

Aux #______________________________, Date____________

Figure 13-3